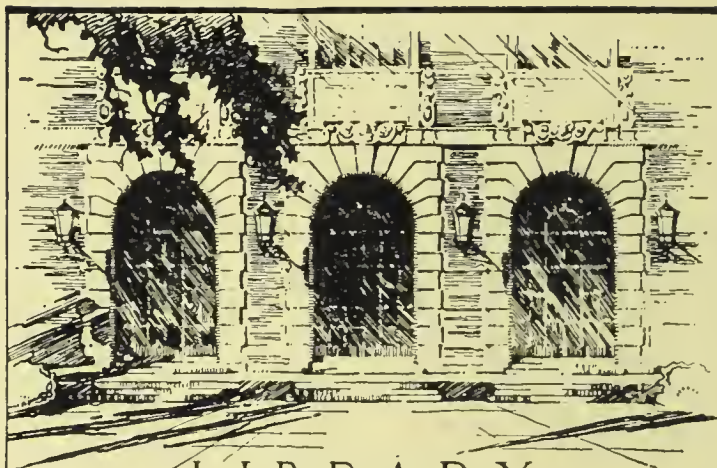


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B.S.B.I. Conference Reports, Number Seven

Report of the 1961 Conference
arranged by the Society

LOCAL FLORAS



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CATALOGUS
PLANTARUM
CIRCA
CANTABRIGIAM
nascentium :

In quo exhibentur

Quotquot hætenus inventæ sunt, quæ
vel sponte proveniunt, vel in
agris feruntur ;

Unà cum

Synonymis selectioribus, locis natalibus
& observationibus quibusdam
oppidò raris.

Adjiciuntur in gratiam tyronum,
Index Anglico-latinus, Index locorum,
Etymologia nominum, & Explicatio
quorundam terminorum.

LONDINI :

Apud Jo. Martin, Ja. Allestry, Tho.
Dicas, ad insigne Campanæ
in Cœmeterio D.
Pauli 1660.

LOCAL FLORAS

EDITED BY
P. J. WANSTALL

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1963

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BIOLOGY

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BIOLOGY 24 Jan 64

THE FRONTISPIECE

This plate was produced from a print very kindly supplied by the Cambridge University Press. It illustrates the title page of what J. L. Gilmour calls elsewhere in this Report (p. 10) 'the first full-scale local Flora'.

EDITORIAL NOTE

This is a report of the proceedings of the seventh Conference held by the Society. On this occasion we had the privilege of using the rooms of the Linnean Society for the whole meeting. The reading of papers and subsequent discussions were held on 24th and 25th November, 1961, and the Exhibition in the Linnean Society Library on 25th November. The full texts of the papers are printed here with the major part of the discussions which followed each contribution. Only in instances of irrelevancy has any part of a discussion been omitted. I was helped considerably at this Conference by Miss F. O. Elword who produced an excellent transcript of the discussions, which were more extensive than at any recent Conference.

The part of the Exhibition which was arranged to illustrate the work carried out on some recent local Floras and on those to be published in the future has been covered in summaries included at the end of this report. The report of the other part of the Exhibition has been published in *Proceedings*, Vol. 4, Pt. 4.

The whole meeting was a tribute to the stimulus provided by the preparatory work for the *Atlas*, which was initiated at the 1950 Conference, for without this stimulus there might not have been so many new Floras in preparation as there are to-day, or such a wide interest in plant distribution. One is tempted to wonder what the position will be at the end of the century: will the public, and naturalists, be more conservation conscious or will it be worthwhile producing Floras of Nature Reserves and National Parks only, because what is left of other areas of 'natural' vegetation will be so poor in species (especially dicots.) as a result of the excessive use of herbicides, that no one who is interested in local areas will wish to publish the localities of the few remaining species. Perhaps the renewed interest in local Floras will go a long way to encourage conservation before the picture painted above becomes a reality.

I would like to express my thanks to those members of the Publications Committee who have helped with the production of this report in providing information and undertaking proof reading, and especially to Mr. E. B. Bangerter, who helped with the transcription of the discussions, and to Mr. D. H. Kent, who as usual accepted a lion's share of the proof reading. I would also like to thank our printers who are so very patient with editors and who seem to know what is required without the need for detailed instructions.

P. J. WANSTALL.

INTRODUCTORY REMARKS

The Conference was opened by the President, Mr. J. E. Lousley, who said:—

It would hardly be possible to select a more appropriate and opportune subject for our Conference than "Local Floras". It is appropriate because every member of the Society needs to consult published local Floras, and every member, however inexperienced, can make useful contributions to new ones in preparation. It is opportune because no better time could have been chosen to review the aims of these works and the methods by which they are produced.

In a few months we will have in our hands the "Atlas" showing the distribution of plants throughout the British Isles plotted on the basis of the 10 km. squares of the National Grid. This represents an outstanding achievement to which most of our members have contributed directly, but it was the availability of a series of local Floras of varying ages covering almost the whole country that made the present standard of the maps possible. It is now time to consider the relationship between the detailed records of local works and this new general study of distribution based on the grid system.

At the present time there are many new local Floras in preparation. Some of these are the work of individuals, others are being compiled jointly or by committees. Some are following traditional lines, others are launching out with revolutionary new methods and aims. The papers we are to hear to-day and to-morrow will provide ideas new to many of us and a valuable opportunity of comparing different approaches to the problems involved. It seems to me essential to remember at all times that every area has its own needs, every worker has his own capabilities, and every district has its own level of financial support. Britain has already produced a series of local Floras which are the envy of botanists in other countries. This is the time to consider how future works can be made even better.

It is now my very pleasant duty to welcome our guests and our speakers. I feel sure that with such a happy choice of subject our Conference is bound to be a great success.

THE CHANGING PATTERN

J. S. L. GILMOUR

In this opening talk of the Conference, I want to look at British local Floras, not so much for their own sake, but as 'mirrors' reflecting the changing pattern of British field botany over the past three hundred years. During this period field botany, like any other scientific activity, has, of course, changed out of all recognition. In the mid-seventeenth century we find a handful of field botanists—many of them with a professional interest in plants—travelling the country on horse-back, identifying the plants they collected with the aid of herbals and naming them with the cumbersome multinomials of the pre-Linnean age. Three hundred years later these pioneers have been replaced by a mixed army of well organised amateurs and professionals, transported by trains, motor cars, and even aeroplanes, equipped with up-to-date manuals of identification, and many of them as interested in the ecology and micro-evolution of the plants they study as they are in their identification. To study this transformation in detail would require a history of British—indeed world—botany, but what I want to attempt to do is to take a small selection of the local Floras written during the period and to point out how these 'microcosms' reflect some of the changes taking place in the larger world of British field botany as a whole.

But first, how do we define a British local Flora? I would suggest the following: "Any formal floristic account of the wild plants of an area less than the whole British Isles". The adjective "formal" is intended to exclude accounts of botanising journeys (e.g. Thomas Johnson's *Iter* and *Descriptio*) and mere incidental mentions or short lists of plants; "floristic" excludes purely ecological accounts, and the word "any" allows the inclusion, not only of books wholly devoted to a local Flora, but Floras forming chapters or sections of larger works.

We must clearly start with the first local Flora. What is it? On my definition there is no doubt, I think, that it is the tiny Appendix on the flora of Hampstead Heath appearing in Thomas Johnson's *Descriptio Itineris* (1632). The *Descriptio* itself, and the earlier *Iter* (1629), are excluded as accounts of journeys; both are very rare, as is Ralph's reprint of 1847. The Hampstead Appendix reflects very clearly the state of field botany at this time. It is a bare list of multinomials, giving a few synonyms, with no information on habitat, time of flowering, or distribution—but it was the first local Flora and, as such, is to be honoured and revered!

Although Johnson's Hampstead must be given pride of place, the first full-scale local Flora was, of course, Ray's Cambridge *Catalogus* (1660). Canon Raven, in his *Life of Ray*, has stressed the great importance of this work in the history of British field botany as a whole, and I will pick out only one or two features of importance for my purpose. The book still consists essentially of a bare list of plants, arranged alphabetically, giving their localities in the neighbourhood of Cambridge; but Ray included many synonyms from earlier writers for his multinomials, and this reflected a growing interest in trying to clear up the nomenclatural chaos that was such a bar to progress in taxonomy at that time.

Ray died in 1704. Great as was his contribution to British botany, he did not succeed in stimulating any large advance during the first half of the eighteenth century. Perhaps the intellectual climate of the times was against this; the culture was largely a classical culture and lacked the enthusiasm for Nature which was to come later, hand-in-hand with the Romantic Revival, and which was to prove such a great stimulus to field botany. Nevertheless, several local Floras did appear during the period, and I will choose Deering's *Catalogue of Plants Nottingham* (1738) as a typical example. It does not show any great advance on Ray's book as regards scope and treatment, and is, of course, botanically much inferior. The arrangement is still alphabetical (although Petiver had used Ray's System in his "Botanicum Londinense" in 1709)—but there is a point of interest in the Preface which, perhaps, foreshadows the great popularity of field botany that was to come. Deering recommends botanising to country gentlemen as a counter-attraction to excessive drinking and reading. "Can there be", he says, "a more agreeable interposition between the bottle and the book than the examination of the Vegetable World?".

As the eighteenth century drew to a close, several influences began to stimulate a wider interest in field botany, and I have chosen four local Floras to illustrate this change. The first is Thomas Martyn's *Plantae Cantabrigienses* (1763), which was the earliest local Flora to use the Linnean system of classification and nomenclature. Linnaeus's binomials, replacing the protracted multinomials of his predecessors, were undoubtedly a potent factor in popularising field botany and soon became universally adopted. My next Flora, Jacob's *Plantae Favershamienses* (1777), was, in fact, the last local Flora to use pre-Linnean names, and also, incidentally, an alphabetical arrangement; but the fact that the author excused this conservatism because he thought it would appeal to non-scientific readers shows that a wider public for botanising was already appearing. Two further points about Jacob's volume are worth mentioning; despite its Latin title, it is written in English, and there is an appendix on the "fossil bodies" of the Isle of Sheppey, which may be regarded as a forerunner of the sections on geology, topography, etc., that were a feature of later Floras.

My third late eighteenth century Flora, Milne and Gordon's *Indigenous Botany* (1793), is not really a Flora on my definition—it is an account of botanical journeys in Kent and Middlesex—but I have included it because of its important Preface, in which the authors attack professional botanists for “being unwilling to exchange the ease of the closet for the labour of investigation . . . on mountains and precipices, in deep valleys and lonely heaths, in ditches and canals, encountering the heat of the burning sun in the open champagne”. Here speaks the authentic voice of the Romanticism that was to come!

In Abbot's *Flora Bedfordiensis* (1798) this voice is even more clearly heard. Charles Abbot was a Society clergyman and he dedicated his volume to Queen Charlotte, “the First Female Botanist in the wide circle of the British Dominions”. In his Preface he says that his Flora is expressly for the use of “the Fair Daughters of Albion”, and it is written entirely in English (including the names of the Linnean classes!). There are coloured illustrations, and the whole work is far removed from the bare lists of Latin names which formed the local Floras of a hundred years earlier.

The stage is now set for the sensationally rapid expansion of field botany that characterised the nineteenth century. To what was this expansion due? A full-scale essay could, of course, be devoted to this question, and I can mention only two or three of the main factors responsible. Some are obvious: the spread of popular education; the opening up of the Continent after the Napoleonic wars, which allowed contact with foreign botanists; the development of railways; the publication of better British Floras for identification; and the founding of a multitude of national and local natural history societies. One factor, however, is rather less obvious, but nevertheless had a powerful influence, namely the change in the general cultural climate from the classicism of the eighteenth century to the Romantic Revival of the early and mid-nineteenth century—a revival that contained a strong element of “back to Nature” in its make-up.

The most obvious effect of these changes in local Floras was, of course, in the numbers published. Up to about 1770 the average was between 1 and 2 every decade; a rapid increase then set in, and the numbers rose to 33 in the ten years between 1850 and 1860. From this point there was a steady fall, due not, of course, to a decline in field botany, but to the fact that most counties, by that time, already had local Floras. So much for quantitative effects; local Floras also reflected qualitative changes accompanying the expansion of field botany, and I will pick out a selection published during the nineteenth century to illustrate these changes.

Kingston and Jones's *Flora Devonensis* (1829) is important as the first local Flora to use the Natural System of classification, though the authors paid tribute to a dying system by including

an alternative Linnean arrangement as well! The first local Flora to use the Natural System only was Lindley's *Flora Bathoniensis* (1834)—and the last to use the Linnean System was, I think, St. Brody's *Flora of Weston-super-Mare* (1856). The *Flora Devoniensis* was also notable for including, for the first time, a wide range of non-botanical supplementary sections on topography, geology, climate, etc.

Another symptom of popularization was the complete replacement of Latin by English, a process, as I have already noted, that had begun in the eighteenth century. The last local Flora to be written in Latin was the third edition of Relhan's *Flora Cantabrigiensis* (1820), though Latin *titles* lingered on for some time; the last was, I believe, *Flora Cravonensis* (1873).

Many of the early local Floras included descriptions of the plants, but with the increasing availability of identification manuals covering the whole of Britain, these descriptions became unnecessary. The British Floras by W. J. Hooker and Babington first appeared in 1830 and 1842 respectively—and the last descriptive local Flora was Bromfield's *Flora Vectensis* (1856).

Although the Romantic Revival provided an atmosphere that stimulated field botany, some of its manifestations were carried to excess and led to a ridiculous sentimentality. The most acute examples of this are in the writings of Edwin Lees (e.g. in *The Botanical Looker-out* (1842), but Webb and Coleman's *Flora Hertfordiensis* (1849), where every family is preceded by a short poem, is perhaps tarred with the same brush).

During the first half of the nineteenth century local Floras gradually improved in their scientific value, fulness of treatment, and, largely due to the work of H. C. Watson, in the accuracy of their distribution data. The culminating point of this steady progress came in 1869, when Trimen and Dyer published their *Flora of Middlesex*. This volume gathered together preceding improvements and set the standard for all future local Floras. There was a full and scholarly history of previous investigations, with a bibliography; detailed distribution was given by districts; pre-Linnean synonyms were listed, and first records for the county were quoted. During the next 50 years many fine county Floras appeared, modelled on Trimen and Dyer, of which the following might be specially picked out: Briggs's "Plymouth" (1880), Townsend's "Hampshire" (1882), Druce's "Thames Valley Series", Hanbury and Marshall's "Kent" (1899), and, perhaps the finest of all, White's "Bristol" (1909).

During the present century many excellent new county Floras have replaced old ones that are out of date, and these have reflected the growing interest, during the period, in the taxonomy and distribution of critical genera, and in ecology. Britain has now, without doubt, one of the finest series of local Floras of any country in the world.

To finish this brief survey, I will say a word about the authors of the local Floras whose history I have sketched. In 1929 I carried out an analysis of the professions of these authors, during the previous 300 years, with some rather intriguing results. Of 131 authors (only 3 of them women), 102 were amateurs and 29 professionals, and, of the amateurs, 56, or nearly 45 % of the total authors, were, as might be expected, doctors (32) or clergymen (24)—both callings affording leisure for cultured pursuits in a rural setting! The better represented occupations among the remaining amateurs included druggist or apothecary (10), country gentleman (6), bookseller (5), business man (3), schoolmaster, nurseryman, and clerk (2 each). No other occupation had more than a single representative; they included a policeman, an astronomer, a china manufacturer, and a manager of an arsenic mine. Field botany is certainly not narrow in its appeal!

WHY AND WHAT?

D. E. ALLEN

‘Why write a local Flora?’ is a question that needs no answer. But ‘Why *publish* a local Flora?’ is one that is posed too seldom, and one that deserves more careful thought than it is usually given. Why not merely store your records in a card-index, for instance, or a record-book and ultimately deposit this in an appropriate institution? Or is there something rather special about a local Flora, something in and of the genre itself maybe, that calls for its permanent enshrinement in print?

If local Floras were no more than compilations of records, then clearly the filing of a manuscript at a museum or library or field centre would be sufficient for the purpose—always provided, of course, that its existence is made widely known and that any records of particular interest are also communicated to county or national publications. But a local Flora is usually more than just a collection of records. It is a guide for others to the plants of a neighbourhood which they need to be able to take into the field. Local Floras that are printed and circulated are also picked up in bibliographies, noticed by chance in bookshops, reviewed or at least referred to in newspapers and journals, bought by public libraries In short, they draw the attention of botanists to that neighbourhood and the attention of the neighbourhood to its botany; they provide a valuable base-line to stimulate further effort; and not infrequently, and perhaps most fruitfully of all, they make converts to the subject itself.

There are other, less practical, inducements besides. The very word ‘publication’ has a certain magical ring about it. Only the best novelists succeed in having their writings published: to ‘get into print’ has thus become a hallmark of distinction, something worth aiming at for its own sake, a contribution which, however small and insignificant, is normally assured (unlike a manuscript) of passing down to posterity. Authors of local Floras, in fact, suffer from all the vanities and delusions of all authors everywhere—with one important exception: unless they are impossibly sanguine, they do not expect their efforts to bring them money.

Granted, then, that publication is a desirable end in itself, what form should the work take? The answer to this, I want to suggest, should spring from three different considerations.

First and most obviously, one must take into account whom the Flora is primarily aimed at. Is it intended mainly for the scientifically-minded? Or for the non-advanced and beginners?

Or for tourists? Or for schools? Too many Floras seem to have been written with the aim of satisfying all groups at once. But is this possible—and, even if it is possible, is it desirable? We shall hear later on in this Conference about the economics of publishing Floras, and I suspect that we shall be told that few Floras ever receive adequate publicity and even fewer sell as many copies as they deserve. Most authors can leave these matters to their publishers; the author of a local Flora ordinarily can not. Unless he is completely unconcerned about the loss to his pocket—or his backers' pocket—he needs to give careful thought to the sort of people who are most likely to buy, and even more importantly *use*, his book. He needs to carry out (if I may be forgiven so commercial an expression) some market research. Frankly, he should ask himself, is the Flora going to be good enough to pass into the top rank, full of enough detail or novelty and sufficiently embracing in its scope to interest advanced workers while also appealing, by photographs maybe or fullish lists of localities, to those who would be scared off by anything too narrowly scientific? If the answer is 'yes', well and good; if 'no', then would it not be better to cast the work in a deliberately more popular mould, jettisoning some of the more technical aspects and livening up the language—without, of course, descending to anything merely catchpenny? Few of us, alas, are J. W. Whites; we cannot hope to write another *Bristol Flora* and please all of the people all of the time. A Flora of a county in particular, once published, effectively spoils the market for any, better work for many years. Too many counties in the past have been lumbered for too long with third-rate works which unworthily bestowed on themselves the official title of County Flora, thereby bemusing not only the innocent, who are always liable to be overimpressed by mere names, but also those blithe cataloguers who would rather a list of county Floras looked as long and exhaustive as possible than was thinned out to form a sensible guide by applying certain standards of discrimination.

The second consideration in writing a Flora that I want to suggest rather follows on from the first. If it is better not to aim higher than one's abilities, it is better, equally, not to bite off more than one can reasonably expect to chew. The last thing one wants to happen is to be tyrannised by one's Flora. A famous clerical botanist of an earlier generation undertook a county Flora of such prodigious dimensions that it eventually took over his whole life, dominating him to such an extent that he became the first vicar, so far as is known, whose church has collapsed while the incumbent was out botanising. The Flora of the Isle of Man, which I am currently engaged on myself, is a holiday Flora. I am happy to spend my two or three weeks every summer or so exploring the interesting parts of the island; but I am not prepared, in the interest of some ideal grid-recording system, to spend these all-too-brief holidays squelching through trackless blanket-bog and combing moors which I have amply satisfied myself are

all but barren. We are not machines: we are only human. And we might as well face up to the fact before we start that perfection is, in any case, unattainable. Why, then, torture ourselves unduly? Field botany is not, after all, a matter of life and death.

Generally speaking, the size of the area that has to be worked automatically decides the degree of thoroughness with which this can be done. Clearly, recording methods that might be appropriate for a Flora of Rutland would hardly be appropriate for a Flora of Inverness. Those whose primary interest is in micro-distribution or who like working areas with the greatest possible thoroughness should avoid anywhere very big.

This matter of size, however, becomes more complicated when the human factors are taken into account. A large area in the south of England will be easier to work, thanks to many more helpers and better communications, than a smaller one in, say, the Highlands or Ireland. On the other hand, the Flora of an area that is comparatively remote will doubtless involve much less chasing-up of old records, while at the same time fewer co-workers will mean less time devoted to checking doubtful records and to correspondence.

Floras that are entirely the work of one person I can see no harm in. At the least this ought to give the resulting work a strongly individual flavour. But most Floras are, inevitably, co-operative efforts, whether the project starts as that of a team at the outset or gradually builds up into one as the compiler enlists the aid of more and more people. The stimulus which the compiling of a Flora can give to a local society is, of course, one of the best justifications for undertaking one. But co-operative work of this kind calls for considerable patience and considerable skill. How far it is taken, and how much fruit it can be made to bear, depend enormously on the personality of the individual compiler. Some compilers do little more than tolerate the rest of their team; they announce that they are always glad to receive records and do little more. At the opposite extreme are those highly-organised projects—one might almost call them campaigns—in which every single person who is botanically capable is contacted, formally enrolled, schooled in the official recording methods, allotted his area for recording, and finally nagged and cajoled into fulfilling his quota.

My personal sympathies lie rather with this, the *dirigiste*, than with the *laissez-faire* approach, but in its extreme form it clearly has the drawback that the organizing can take up almost as much time as the field-work itself. We can, I fear, only hope for these highly-disciplined operations in parts of the country where competent botanists are fairly thick on the ground and in frequent personal contact. Much more usually, the compiler of a flora is forced to compromise. There will be many potential helpers, but they will be extremely scattered, some resident in the area, some frequent visitors, some accidental casuals. Some can be met in person, others will be mere names at the bottom of

letters. Some will be excellent and wholly reliable, some erratic, most at the best uncertain. Each will have special quirks and failings: there will be Mr. X, who avoids 'the yellow flowers', Miss Y, who only sees large plants, and Mrs. Z, who only paints. Some will never climb mountains, some will ignore trees or grasses, some will refuse to collect voucher specimens. All must be humoured, understood, allowed for, fitted into the recording system as best one can, because all without exception may be able to help, some in one way, others in another. The beginner, we must never forget, always has enormous, unfair, quite incredible luck. In his ignorance he goes to parts where everyone knows nothing of interest could possibly occur. A high proportion of all the most exciting discoveries are made in the wrong places, by the wrong people, and by mistake.

A good compiler will know the blind spots of each and every one of his contributors. At times he will have to be severe, even ruthless: spared feelings make bad botany. And this, I have always thought, is the best argument for including biographical notes in local Floras. To be of greatest use, these should, ideally, enable the reader to assess the botanical standing of every major contributor, and to this end they need therefore to be as sharply-chiselled as politeness will allow.

The encouragement of helpers is also, of course, one of the best arguments for reproducing lists of localities and finders' names. The inclusion of these is, perhaps, currently the most controversial feature of local Floras. Some, I know, would like to eliminate them altogether: they are expensive to print, horrible to proof-read, and as indicators of distribution patterns only meaningful to readers with a first-class knowledge of local geography—for even if a map be included or grid-references to all place-names, only readers with a special purpose will have the energy to plot them and thus put them to proper use. If a local Flora is to be anything more than a printed catalogue or a book of clues for treasure-hunts, it thus seems imperative that the author should provide for each species a brief summing-up of the distribution as implied by its known localities. This is assuming that the decision has been made to include localities at all: I appreciate that some would like to abandon them, more or less entirely, for maps.

At the same time, while being mindful of one's contributors, it is a mistake to be too optimistic about the help that will be forthcoming from them. Other people will not be all-familiar with the geography of the area (as the compiler should be), with the past records, with the relative frequency of the different species. Nor will they necessarily have the same keenness to make lists or to work dull areas as thoroughly as they should. Contributors, alas, are not labour units, but ordinary men and women (and maybe even children)—and, what is more, busy and often temperamental people whose work is entirely voluntary and may never even materialise if they are not approached in the

right manner and given regular and appropriate encouragement. Most Floras, in short, are more than just a matter of field-work and scholarship; they are subtle achievements in human relationships. Compilers are like conductors: if they have no skill in getting people to play together, they had better abandon the attempt, for they will only produce wrong notes.

The third and final consideration in writing a local Flora that I want to suggest is, while less basic than the other two, all the same necessary if a work is to stand out from the common run. A good Flora, I suggest, needs a personality, a character all its own, some originality in approach which will lend it distinction—if we must have the word, a ‘gimmick’. Ideally this will arise naturally out of the individual character of the area itself, or of its special suitability for displaying some new approach or technique. Professor Good found in the smallish but physically diverse county of Dorset an excellent subject for the highly detailed study of distribution in relation to soil type and rainfall. Dr. Dony gave extra depth to his *Flora of Bedfordshire* by making a special feature of habitat studies. “A Contribution to the Flora of Merioneth”, now just appearing, pays laudibly close attention to hybrids. A Flora of a mountainous county will naturally lay emphasis on the altitudinal range of different species; a Flora of a small island on the evidence provided by botany for the date of its severance from the mainland, or on the ecological effects of the absence of certain species, or on the variation resulting from isolation. Alternatively, a Flora may acquire a special character arising out of a special interest of the author’s, unrelated to the area in question. Scott Elliot’s *Flora of Dumfriesshire*, in most respects a disappointing work, is at least memorable for the attention it gives to the insects noted as visitors to various plants.

For contrast, look at some of the ‘grey’ Floras—that of Surrey, for instance, or of Leicestershire and Rutland. These are competent and thorough; they include everything it has become the convention to include; they are valuable additions to knowledge. And yet they are dismally flat, almost boring to read. No one would think their authors actually *enjoyed* compiling them. They are little more than card-indexes grown up—and exhibit all the shapelessness of their birth.

The trouble with these and all too many like them is that the standard model for the local Flora, welcome and fresh when first established by Trimen and Dyer, has been allowed to grow stale and banal. A type has become a stereotype. Features which were appropriate for a local flora fifty or even twenty years ago are no longer appropriate to-day. First Records, for instance, except in the case of alien immigrants, have surely become a meaningless ritual? And must we have those same repetitive titbits of folklore? Let us have either no folklore at all or else an avowedly folklore-angled Flora. Let us have colourful Floras at all costs, even if it means breaking up a familiar pattern we have grown used to and fond of.

There is nothing, apart from the records themselves, which *must* go into a local Flora. Let each author only include what he honestly feels can be properly covered. Climate, geology, soils, land-use data, the post-glacial history of the vegetation, cryptogamic groups—yes, include these by all means, if you have enough information and, best of all, can write them up yourself. If the author genuinely *cannot* cope with some or all of these secondary subjects—and some authors never even try—then careful thought should be given to the problems of farming them out. There are always drawbacks to a Flora contributed to by several hands: unevennesses of treatment, irrelevancies by the non-botanical, gross disparities of style. I repeat: better character than completeness—which, in any case, is an elusive ideal.

Finally, and above all, let us be clear what it is we are basically trying to write. Must a local Flora necessarily be viewed primarily as a contribution to biological science? Would it not sometimes be better viewed more as a contribution to geography? Perhaps we tend to overestimate its importance in one direction, while perhaps at the same time we tend to underrate it in another.

Discussion

Dr. BOWEN raised the question as to how frequently county Floras should be published. Until recently every 50 years had been sufficient, but even this was a shorter period than was usual. He considered that the tremendous amount of new interest in natural history to which the Director General of the Nature Conservancy had recently referred could revolutionise the Society in the next 40 years, even increasing the membership by a factor of ten. This would make a difference to the frequency of publication of new Floras.

Dr. PERRING wished to challenge Mr. Allen's statement about Floras written by more than one person. Perhaps Mr. Gilmour would comment; had he any statistics about the success of Floras written in this way?

Mr. GILMOUR said he had no statistics on this point. Certainly there had been some very good Floras written by more than one person. Mr. ALLEN added that we did not know whether in fact such Floras had been written by more than one person. Did one or two people write Hanbury and Marshall's Flora?

Mr. BANGERTE said it was of some interest to consider the personality of the author. He particularly remembered Col. Wolley-Dod when he was writing the *Flora of Sussex*. It was customary for him to go to the Natural History Museum and take copious notes from the herbarium and library. When he arrived home he would find that he often could not read his own notes and would send a postcard to the Museum to ask for them to be checked. This may explain how some mistakes got into this particular Flora.

Mrs. RUSSELL wondered why only three Floras had been written by women—was it their sensitiveness, or did they reflect on the beauty of white paper before they wrote?

Mr. MEIKLE thought women had been otherwise engaged for when one examined the more difficult groups of plants, e.g. lichens and marine algae, one found that women workers outnumbered men, so perhaps women are cleverer than men.

Mr. DAVID asked why there were not more supplements produced for Floras? Where there was a good basic one would this not be a good way of bringing it up-to-date? Dr. BOWEN thought that this was a way in which the Society could help by publishing more supplements in *Proceedings*.

Professor HAWKES disagreed with Mr. Allen about dull ground being unproductive. From his experience if they had not gritted their teeth and gone through dull areas they would not have found many of the interesting records.

Mr. READETT claimed that it was the first time it had been seriously suggested that there is a place for humour in a local Flora. He found the suggestion of supplements for floras very interesting and thought this point should be considered when the flora was being planned.

Mr. BANGERTE asked whether the regular production of supplements, by virtually making a new Flora unnecessary, would not tend to destroy the production of a flora with individuality? Mr. ALLEN agreed, for there was a risk then that a Flora would perish from 'appendicitis'.

Mr. MURRAY thought there would always be a lot of bright young men who would want to go on writing their individualistic Floras.

Mr. KENT considered that the real author of the *Flora of Middlesex* to be the Rev. W. W. Newbould. Trimen and Dyer did a certain amount of field work but Newbould did most of the literary research. Hind and James Britten also assisted with its production.

Mr. LOUSLEY came to the conclusion that young people should be encouraged to work on local Floras, but they should also be encouraged to get advice from more experienced workers.

DEFINING THE AREA

R. D. MEIKLE

I am sure you have all, at one time or another, suffered or possibly enjoyed contemporary drama, the significant sort of play where long and pregnant silences are briefly interrupted by obscure and disconnected utterances. Well, when I came to consider what I could say about "Defining the Area" I was driven to the conclusion that the techniques of the *avant-garde* theatre offered me the only hope of escape from a very embarrassing situation.

How does one talk for thirty minutes about something so nebulous, so abstract and so amorphous? To define means, I presume, to demonstrate the limits, or to throw a boundary around something. And as this is a botanical conference on local Floras, and not a séance or a space-travel symposium, the "area" is presumably intended to refer to the amount of ground that can be conveniently and appropriately enclosed within the boundaries of a local Flora. What area, in other words, should be chosen by those who intend to compile a local Flora? The answer is, of course, any area, for if we view the vegetation of this planet as a whole, then the "Flora Europaea" becomes a local Flora—if our minds are dominated by the botany of Europe, then "Clapham, Tutin and Warburg" becomes a local Flora—and if we are intrepid enough to devote our time to writing a British Flora, then the Flora of Devon, or Gloucester or Sussex becomes a local Flora. One could write a Flora of a back-garden—and I'm sure it has been done—and parish Floras are by no means uncommon. There is a *Flora Bel'astiensis*, a *Flora of Harrow*, a *Bristol Flora* and many similar works dealing with areas larger than a parish, but considerably smaller than a county. Sometimes the area is defined as being within so many miles radius of a convenient centre; sometimes the authors are so vague that when they call their book the Flora of Somewhere-or-other we can only conclude that the area intended is an unstated sphere of influence—just as one might, for instance, compile a very useful Commuters Flora of London which would include large and undefined portions of Kent, Surrey, Berkshire, Buckinghamshire, Hertfordshire and Essex, with special reference to the vegetation of railway banks. In defining an area it is not necessary to put lines on a map, or to attach visible or calculable limits to the space we intend to survey. In fact—and I will return to this later—I sometimes think that the compilers of Floras are so obsessed with divisions and boundaries that they lose sight of the proper purposes of their

work. But I suppose, as human beings, leading a finite existence, and encompassed everywhere by frontiers of one sort or another, we tend naturally to attach an exaggerated importance to lines of demarcation. And I suppose it is for similar subconscious reasons that most writers of local Floras have chosen the ancient, historical and traditional area denominated "County" as the most usual area for their researches. The "County" has a definite emotional appeal—we are attached by bonds of loyalty to our county—some of us even like to identify ourselves with it, and are flattered with the title "county" or "one of the county". I cannot imagine anyone becoming emotionally attached to a grid square—unless the "squares" we hear so much about at present are simply the up-to-date counterparts of those who used to be known as "the county". For most purposes the county is still the area which the majority of writers of local floras favour. Its boundaries are for the most part fairly well charted, it has historical associations, and local patriotism, if nothing else, will generally ensure a certain quota of sales in return for the expense and sweat of Flora compilation.

But the county is not always the perfect area, some counties, such as Yorkshire, are so absurdly large that they have to be subdivided, and some such as Rutland or Huntingdon are so absurdly small that they are invariably swallowed by a more normal-sized neighbour. A few counties, such as Flintshire, have odd bits and pieces scattered about adjacent counties, and many counties shoot out long promonteries and peninsulas making awkward enclaves in the territory of their neighbours. Worse than this, county boundaries are nothing like so immutable as is often supposed; for various administrative reasons bits are continually being subtracted or added, and it is quite possible, for instance, that the *Flora of Wiltshire*, published as recently as 1957, may in a few years' time relate to an area no longer identical with the county of Wiltshire, if, as is proposed, this county is enlarged at the expense of Somerset. There is also the problem of county boroughs such as Bristol and London, which have no existence in botanical literature, and which may well be appropriated by rival workers on several distinct county floras.

Some may suggest that we should, in the circumstances, accept as final the county and vice-county boundaries outlined in Watson's *Cybele Britannica* and *Topographical Botany*, or in Praeger's *Irish Topographical Botany* and ignore those changes which are constantly being made to the area and limits of our political counties. The Watsonian and Praegerian counties and vice-counties have definite historical and emotional associations for botanists, and they have names and numbers. But there are difficulties, which I am sure Mr. Dandy will explain in some detail. The boundary lines are, I believe, not always as clear as they might be, and the 1 degree longitude line which divides Norfolk and Suffolk has always presented difficulties in the field, as Watson himself surmised. Moreover I find it hard to believe that the

authors of county Floras will be prepared to accept the counties as outlined in *Cybele Britannica* and *Topographical Botany* especially where recent administrative changes have added to their territory, and more particularly where these additions are of particular botanical interest.

Should we then depart from the county tradition altogether, and accept in its place the anonymous uniformity of the Grid square? For some purposes, as for instance with the Maps Scheme, the Grid square works admirably, and it has the additional merit of dividing the whole country into equal parts, so that one is not obliged to subdivide unmanageably large areas, nor to merge small areas with larger neighbours. But the Grid square has no historical or emotional associations. Its boundaries seldom, if ever, follow any natural physical features. It has no name. And one cannot imagine that the Flora of Grid Square x or Grid Squares x, y and z would ever be best-sellers.

Since then there are objections to making the areas of our Floras co-terminous with the administrative County, the Watsonian county and vice-county and the Grid square, is there any alternative definition which is likely to be more satisfactory? Quite frankly I doubt if British botanists will be prepared to depart from the time-honoured county Flora, though I think there is an alternative. I seem to remember that a former President—I think of the Dublin Naturalist's Field Club, though I may be wrong—made great sport of those enthusiasts who devote their energies to making new county and vice-county records. He spoke of the gentleman who was seen poking a crab with a stick in the hope that it would move across a small inlet and allow him honestly to record it from two adjacent counties. I have been told that students of the genus *Potamogeton* are sometimes similarly employed, and it has been reported that certain eminent botanists show a marked partiality for county and vice-county boundaries when they take an airing, and are to be met with, large scale ordnance map in hand, gazing alternately from side to side, like spectators at the Centre Court, hoping to kill two records with one sweeping glance. I'm not saying that these stories are true, but I do believe the county and vice-county system has over-emphasized the importance of "new records", and has encouraged the sort of one-upmanship which is detrimental to the interests of systematic botany. Over a century ago Edwin Lees wrote a book on the botany of the Malvern Hills, and I have sometimes thought that we might more often depart from the county and choose instead certain natural physical features of this country for detailed floristic examination. Although several works of this sort have in fact been published, it is surprising, if one goes through the pages of N. D. Simpson's *Bibliographical Index* how very few areas have been written up floristically in this way. True enough there are numerous references to the "Plants of Whiteacre" or "The rare plants of Blackacre" or "A visit to Greenacre", but this is not quite what I mean, for by a Flora I intend not merely a

selective list of exceptionally interesting plants, but a comprehensive survey outlining the distribution, habitat and relative abundance of each species, subspecies or variety. Some will say that such a compilation falls within the province of ecology, to this I would reply that every systematist should be something of an ecologist, and that every worth-while Flora should combine ecological, phytogeographical and taxonomic information. The reason why so many Floras do not do so is largely because the county as a unit of area is altogether too extensive for such co-ordinated researches. If a smaller area is chosen, especially one with well-marked physical boundaries, then there is no reason why all this information should not be provided. Furthermore one might hope to see more attention given to the distribution and ecology of non-vascular plants than has been the case in the past. And perhaps local zoologists might be encouraged to compile a supplementary volume on the fauna. The Clare Island Survey, organized by the Royal Irish Academy, is an outstanding example of such detailed collaboration amongst naturalists, and I still think, of all relatively recent natural history undertakings, it was quite the most worth while. The area chosen need not be any larger than a few square miles, the number of workers could be proportionately small, and the results might well be published at a modest price in a small pocket-size volume, or even in the pages of *Watsonia* or the *Proceedings*, perhaps over a series of issues.

I am sure we are all inclined to be too grandiose when we "define the area", and I greatly regret the passing of the age when the parson, the doctor, the schoolmaster or the local gentleman-naturalist were content to concentrate their attention on one small, much-traversed and much-loved area, so that they came to know it thoroughly from every aspect. Nowadays we speed from Land's End to John O' Groats in our fast cars, saying, like Lord Dundreary, "I've been everywhere, and seen everything, and there's nothing in it".

Discussion

Mr. DANDY opened the discussion by saying that Mr. Meikle had covered the ground so excellently that it only remained for him to dot a few i's and cross a few t's. What is a local Flora? By world standards the "Flora Europaea" will be a local Flora. In the present context, however, the outer limit is the boundary of the British Isles, and the local Flora is one which deals with only a particular part of these islands. The first necessity in Britain, as elsewhere, is to have a good standard national Flora which gives a comprehensive account of the plants of the whole country, and with which local Floras can dovetail. Such a national Flora should provide a generally acceptable classification and correct nomenclature, and should incorporate descriptions of the plants, with keys to assist in their identification. The local Flora, on the other hand, has no need to repeat this descriptive identifying matter but should supplement the national Flora by giving a far more detailed account than could be given

in that Flora of the plants occurring in the restricted area concerned, with precise information about their distribution, ecology, and so forth. But what should the boundaries of such local Floras be? We can, of course, have Floras of England, Wales, Scotland and Ireland: local Floras, it is true, but dealing with areas too large for the desired detail of treatment. On the other hand we can have, as Mr. Meikle said, Floras of specially interesting areas such as the Lake District. We have a Flora of the London area, and there have been Floras (or at least floristic lists) of such small units as football fields and pollarded willows. Such works have their interest, but what is wanted ideally is a system of local Floras which, side by side, cover the whole of the country, interesting and unexciting areas alike; and furthermore (though this is scarcely practicable) these Floras should be more or less simultaneously produced—a Flora of say, Gloucestershire, produced very recently, is not really comparable with a Flora of Essex published a hundred years ago. How can the country be divided up most conveniently for local Floras in the sense he had mentioned? He thought there were only two possible ways, bearing in mind that the lines of division must be discernable on maps: (1) Grid squares of selected size, and (2) counties. It had been pointed out that Grid squares have no real appeal, and certainly they have the disadvantage of having no names, no history and no actual boundaries on the ground. Counties, on the other hand, have a number of advantages as units for local Floras: (1) the country is wholly divided into counties, so that if we have a Flora of every county we have the detailed Flora of the whole country; (2) although there are a few exceptions, counties are reasonably comparable in size; (3) the county is already the traditional unit for local Floras in this country, and it is closely linked with the vice-county system by which plants have chiefly been recorded during the last century; (4) counties usually have boundaries which are discernible in the field; (5) botanists often have county loyalties which act as an additional stimulus in the production of county Floras.

The main difficulty about counties is that although they have long histories there is no longer any guarantee of their stability: their boundaries alter periodically, and there are now proposals to make drastic changes which might even mean the disappearance of some counties altogether. If it is accepted that counties should be the basis for our local Floras, then it is necessary to decide how we are to define the counties in view of possible change. The answer to this, he thought, was for each county Flora to cover the county in its broadest sense, that is to say to cover the county as it is delimited to-day, together with any other areas which have been included in the county during say the last century (roughly the period in which the vice-county system has been in use). By this means we can ensure that all the country is covered, and the fact that there will be some overlapping is not really important. It simply requires that the author of the Flora should clearly indicate the limits of the territory he is dealing with, pointing out what boundary changes have taken place in the past, and relating the whole area to the vice-county system. Of course some county Floras have already been produced on these lines, and in his opinion they provide examples to be followed in the future.

Mr. LOUSLEY said Mr. Dandy had indicated one practical way of dealing with the problem.

Mr. WESTRUP suggested that a re-definition of vice-counties be made on the basis of the present counties as they have been in operation for well over a century and have well defined borders, unlike many of Watson's vice-counties. The division of Hampshire was by a road which had been very considerably re-routed not long after Watson's time. He also had in mind the parish of Martin (v.c. 8) which had originally been in Wiltshire, is now in Hampshire and may well be transferred to Dorset if the recently proposed boundary changes come into force.

Mr. DANDY said he was not suggesting the vice-county boundaries should be altered. The minute they were altered the value of vice-counties would be lost altogether. What he was suggesting was that county Floras should indicate where there had been changes in vice-counties.

Mr. DAVID said there were objections to both the vice-comital and the Grid square system in defining the area. The vice-county is seldom a natural area; an agglomeration of 10 Km. squares lacks character. Division into geographical features was an alternative, but it would be hard to cover all the ground in this way: when the "Flora of the Malverns" and the "Flora of the Cotswolds" have been done, who will want to get down to the "Flora of the Bit-between-Malverns-and-Cotswolds"? In these days of co-operative teamwork, when perhaps larger areas than the old vice-counties can be conveniently surveyed, was there something to be said for making the Grid squares the basis but grouping them into much larger areas than the county, e.g. into "Peninsula" or "East Anglia", which have some natural coherence?

Dr. DONY said there was one big difficulty—that of defining the natural areas. The Cotswolds as one example was covered by five or six counties.

Professor HAWKES thought there was a great deal to be said for keeping Watson's vice-county boundaries as it would enable one to consult historical areas and so save a great deal of trouble. The vice-county boundary was similar to the county boundary in most cases and he wished to make a strong plea for vice-county boundaries for Floras.

Mr. HALL asked whether the Society could sponsor some sort of publication which would once and for all define the vice-county boundaries? Mr. SMITH wondered whether the expense was really worth while.

Mr. DANDY said that a tremendous amount of work had been done towards a vice-county publication and that a very great deal of material exists in the form of marked maps, etc. These were awaiting their final touches but should now be held back until the national changes have been made. These maps are deposited in the Department of Botany at the British Museum (Natural History), and are available for study by bona fide students.

Dr. BRADSHAW asked Mr. Dandy whether these maps were consulted by workers other than botanists? He replied that there were other departments at the Museum, e.g. Zoology and Entomology, which made use of the vice-county system.

Mr. GILBERT said that so far little had been said about the Grid square system. One of the troubles of such a system was that boundaries are not defined, whereas parish boundaries are clearly defined by roads, dykes, etc.

Mr. CHANDLER pointed out that one found the same difficulty in county boundaries as for example when rivers altered their course. Mr. ALLEN thought someone should mention mobile plants!

Mr. STACE stated that good Grid records are one of the best for local Floras and asked whether there was any real need for conformity in method of approach over the whole country. He suggested that the Weald, because of its distinct geological series, would provide a very good basis for a Flora and he felt that if such areas were overlooked people were missing a great opportunity.

Mr. DANDY was not advocating county Floras as a sole basis for the complete mapping of information over the whole of the country, nor was he deprecating the publication of interesting Floras of areas such as the Weald. He was simply thinking of the practical value of a uniform survey made of the whole country.

Mr. SEDDON thought there would be great difficulties in using natural or arbitrary boundaries. He thought the 1 Km. Grid square was a sufficiently small unit for practical purposes and he reminded the conference that a point could be defined with a six-figure Grid reference of satisfactory accuracy for plotting distribution. He was in favour of using the Grid square within the county as the unit for publication.

Mrs. LE SUEUR considered the use of squares the most useful way of collecting records, but Dr. PERRING could not imagine anyone writing a Flora of one square.

DIVIDING THE AREA

F. H. PERRING

Two questions have to be asked about dividing the area: "Why?" and "How?". To the question "Why?" the answer falls into two main categories: (i) for the collection of the data, and (ii) for the orderly presentation of those data in the published work; and to the question "How?" the number of answers is infinite, but I shall try to elaborate the main methods which have been used in the past and make suggestions about those which seem most suitable for meeting present-day conditions and for satisfying the reasons put forward for dividing the area in the first place.

Though local Floras were first written over 300 years ago it has only been during the last 100 years or so that there has been a feeling that division of the area was necessary. This is hardly surprising. In the early days local botanists were trying to produce satisfactory county lists—a process which culminated in Watson being able to produce *Topographical Botany* in 1873. By then we had, as it were, divided the country into counties or vice-counties as units of botanical study. After *Topographical Botany* the counties themselves could be divided. This was clearly not a very conscious process—dividing of counties in the south had begun before listing of all those in the north and west had been completed.

The first county Flora I have found which discusses the problem of dividing the area is *Flora Hertfordiensis* by R. H. Webb and W. H. Coleman (1849). In it there is an appendix by Coleman on the plan of the Flora: he is mainly concerned with arguments for dividing the county so that the collection of the data shall be as even as possible:—

"In collecting materials for the present work, it was soon discovered that it would give but a very imperfect view of the botanical productions of the county collectively, unless not only diligent search had been made for the *rarer* species in every part of it, but also some security could be given that the prevalence of the plants presumed to be *common* was *really general* throughout it". He went on to say that the authors realised at one stage that the publication proposed could not be called a Flora of Hertfordshire but merely one of Hertford, Hitchin and St. Albans. So Webb and Coleman set out deliberately to make a suitable division of the county so that they would study it systematically.

Unevenness of survey is a fault which can be levelled against nearly every local Flora which has been published, but it has become very apparent to me that, despite the foresight and warning given by Coleman 113 years ago, some county Floras have been published during the last 25 years in which part of the area has hardly been investigated at all. In one, for example, from which I attempted to get lists by 10 Km. squares the product varied from 500 species down to 50. Moreover, it is not only that certain corners have hardly been visited, but there has been a too ready assumption that the common species in the immediate area of one's home are in fact common throughout the county. This was brought out by Good in his *Geographical Handbook of the Dorset Flora*. Good made 7,500 lists in the county and then arranged species in order of frequency. He compared this order with statements in the *Flora of Dorset* by Mansel-Pleydell that species were "common or generally distributed". He found these statements covered species which he had recorded on 4,000 occasions as well as some which he had seen only 40 times. My own work in extracting records for the Maps Scheme has made me aware of how loosely applied has been the use of the term 'common' in Floras in the past, and not infrequently I find only this bare statement when I have received no records for a species from a county during the last eight years.

Clearly then two reasons for dividing the area to collect the data exist, to ensure that the county is surveyed evenly and to ensure that a proper study is made of all the species in the flora, not just the rarities.

In considering why we should divide the area for *presentation* of the data we must bear in mind the user who, as far as distribution data is concerned, usually has two questions—Where can I find it? and Has he got it from there? The first question is surely mainly directed towards the rare and local species, particularly for the visitor who needs some indications which will give him some hope of finding what he is looking for. Not so precise that there is no sense of re-discovery, not so vague that he will waste his time in every case. Thus a completely geometrical or even parish distribution will not be satisfactory for the rare and local species.

On the other hand 'has he got it from there?' can apply to the whole Flora, and a published summary in a convenient form of the known distribution of the species can enable the user to discover whether or not he has made an interesting discovery which should be passed to the author or his heirs. Now here the size of the areas is very relevant. If the units are very large the user is going to find great difficulty in making any new contribution, if it is too small the author may be bombarded with additions. I shall return to this when I have dealt with the problem of how the area is to be divided; but I feel we must constantly keep the user of the Flora in mind when we set about dividing the area.

How then is the area to be divided if we can now agree that divided it must be? Once again we can return to Webb and Coleman (1849) for an early discussion of the problem. They tried:

- (i) Dividing the county into regions within a 5 m. radius of the main towns.
- (ii) Constructing hexagons by joining points bisecting the distance between every two adjacent principal towns.

Both these were rejected as being impossible to follow in the field and so they hit upon the idea of using river basins. There were twelve in Hertfordshire, a county of 528 square miles—thus the average size of a river basin was only 44 sq. miles—though the variation was somewhat large, from 29 to 76 sq. miles, i.e. ratio $1:2\frac{1}{2}$. It is important to realise that in the county in which the method was pioneered the areas were reasonably small (a little larger than a 10 Km. square) and numerous—for this method was accepted without much argument by subsequent generations of Flora writers—though it was rejected at once by Babington who wrote in his *Flora of Cambridgeshire* (1860): “The river basins cannot be used, for we can hardly be said to have more than one, indeed it is rather the elevations which point out a difference in the vegetation than the depressions”.

Webb and Coleman actually used their river basins as collecting units and I would like to refer you all to Coleman’s description of their method (p. 364).

“The following was our method of cataloguing. A book was prepared, containing thirteen columns, the first of which was occupied by the names of the plants thought likely to occur in the county, and the remaining twelve, corresponding to the number of the districts, were left blank, intended for the record of the species when found in each district. Some promising spot, as central as possible within any district, was then repaired to, and the observer started on his walk with a small vasculum in hand, in which he deposited a small characteristic “pinch” (no larger than was absolutely necessary for identification) of every species that occurred. When the box became full, or a convenient halting place was reached, the prepared list was taken in hand and deliberately read through; and as often as it occurred to the memory that such a species had been gathered, a figure corresponding to the number of the district was entered in the proper column opposite to its name. When the list had been gone through seriatim, the collecting box was opened, and its contents singly but rapidly removed; and if it was doubted concerning any of them whether or not it had been recorded, the book was referred to; but this was seldom found necessary; scarcely more than one per cent. being generally omitted in the first marking. The box being emptied, the walk was resumed, and a second collection made of everything not previously recorded. In this manner as many as 300 species have been catalogued in a single

day. If two collect together this process is much expedited, and in default of leisure on the part of the principal at any particular season, the services of a beginner may be made use of, to bring or send from the district a fragment of every species he may meet with. The process should be repeated at several different points of each district, and in different seasons of the year: but to prevent confusion no two districts should be visited on the same day”.

It in fact differed very little from the methods which have been used to collect records for the Maps Scheme and which we have used in preparing the new Flora of Cambridgeshire.

Webb and Coleman actually used the river basins both for collecting and publishing their results but though the two are related it can surely not be possible in many cases. Thus in Grose's *Flora of Wiltshire* there are eight river basins with an average area of over 200 square miles yet Grose made 4,500 lists scattered over the county in collecting his data.

All the arguments used in determining how to collect records for the Maps Scheme in the British Isles as a whole are relevant to the problem of dividing the county. It has been thought out in a number of European countries since 1900, e.g. Goethart and Jongmans (1902) who prepared plant maps of the Pays-Bas in Holland using rectangles as a basis 1045 m. \times 1250 m. These units were adopted for the country in 1930. In 1940 rectangles were adopted in Belgium and by the 1950s the system was extended to Luxembourg. Luxembourg's experience is relevant in considering our own counties. It is an area of 50 \times 35 miles, about the size of one of our medium English counties, e.g. Suffolk. In a recent paper on the Luxembourg project (Reichling, 1956) the organiser discusses the division of the area by political units and, speaking of the British vice-county system he says, “Inconvenient: les surfaces ainsi fixées sont souvent de très inégale étendue et de forme bizarre”.

And so would be any division of a county by political boundaries or physical features. In Cambridgeshire our parishes vary in size from just over 100 acres in the south to something like 30 square miles in the fens—and their shapes are certainly bizarre.

Thus I believe that for collecting the data it would be better to choose some form of artificial grid system based on the National Grid, unless some natural division by chance gave areas of almost equal size or are obvious, in the same way that islands might be, for example, in the Orkneys and Shetlands, though even here some method would have to be chosen to subdivide the larger units.

The most obvious basic unit is the 10 Km. Grid square. It is marked on all 1" ordnance survey maps and the 2½" series cover exactly one 10 Km. square at present—though the new issue just commencing is 2 \times 1½ 10 Km. squares. Despite the objections first raised by Coleman that a purely geometrical system was impractical we must remember that maps issued to-day are far better, and with field boundaries and all buildings marked there is

really no difficulty in the field. Our experience with the Maps Scheme has shown this.

The advantages of using the 10 Km. square at this time are that, whilst a national scheme exists records made in a county can be fed into it whilst, reciprocally, any records made now or in the future by botanists during their field trips will be available for anyone meeting the challenge of producing a new county Flora later. Thus if, in 1970, someone starts to work on the Flora of Radnorshire the 10 Km. sq. records made in 1955 will be a useful starting point for his researches.

But, I am only suggesting 10 Km. square as a basic unit. For most counties such a unit will be too large for a thorough survey of the flora. The average vice-county has a little over 20 whole 10 Km. squares—a number of units of the same order as that by which Hertfordshire was divided over 100 years ago.

A 10 Km. square can be subdivided, and it is important at the outset to decide by how much. This decision depends upon many factors: the main ones are probably:

- (i) Number of botanists available (or botanical time).
- (ii) Variety of the terrain.
- (iii) Publication envisaged.

(i) The question must be asked—How many lists can be made in, for example, 10 years, taking into account the amount of help one can expect to receive from other botanists? And can I deal with all the data collected in the summer during the winter? One's own age and health must be considered here. The sort of calculation I suggest goes as follows:—

Maximum number of lists/square/week	4
Number of weeks/annum	25
Number of lists/square/annum	100
Number of lists/square/10 years	1000
Number of visits to each square	3
Number of units into which to divide area ...	c.350
Average No. of 10 Km. squares/v.-county ...	25
Number of divisions/10 Km. sq.	12-16

If you divide a 10 Km. square into smaller squares using the Grid lines there are three possibilities:

- (i) 4 × 5 Km. squares.
- (ii) 25 × 2 Km. squares.
- (iii) 100 × 1 Km. squares.

A final decision must depend upon the terrain and the assistance you can expect but I believe there is no need to be a slave to the square or the fine details of the grid. If you want 16 squares/10 Km. sq. then use a $2\frac{1}{2}$ Km. square—it will take less time to mark your set of $2\frac{1}{2}$ " maps than to cover all those extra squares three times each. Of course county boundaries do not

follow neatly along Grid lines and there is the problem of what to do with the little pieces left over when you have adopted some sort of grid system. This is precisely the same problem as we have had with coastal fragments in the Maps Scheme. Our answer there has been to combine records for those portions with adjacent squares for publishing purposes though the records in them have been collected separately.

Lest you should think me too much of a square I would like to make a suggestion for those who are writing new Floras and have inherited a county already divided—shall we say into river basins. Then your problem is very much like the Maps Scheme had when inheriting the British Isles already divided into vice-counties. If you want to keep your river basins, and it is often difficult to do away with them, if you wish to integrate old records with the new, I suggest you divide the county by squares but where they are crossed by the old division lines collect separate records for each portion.

Finally, as I have already indicated, the way in which the data are to be presented must be kept in mind, as well as the way in which people are going to use your Flora.

Two points it is essential to be clear about :

(1) Collection and presentation can be quite independent. Thus in Cambridgeshire we have collected from a random scatter of 1 Km. squares but presented the results on a 10 Km. basis. This was possible—for our geology is very simple, with large areas of similar terrain. For the widespread species we have been content to use the convention 'All Squares' to indicate the presence of the species throughout the county.

This leads naturally to the second point :

(2) It may not be necessary to deal with all species in the same way.

- (a) Common species. Those which occur in all squares throughout the county. The user of the Flora is not going to require further information particularly if some habitat note is added. Probably about $\frac{1}{4}$ of the species are in this class.
- (b) Rare species. These are species which, as far as is known have only one or two localities in the county. The account of each will be very full. Localities may be 'classical' and the author will have to make a special study—checking the locality of each to confirm continued existence or extinction. This group probably accounts for another $\frac{1}{4}$ of the total flora.
- (c) Medium species. This group is the largest and most interesting. In Cambridgeshire we have expressed their distribution as a list of 10 Km. squares and included a map which shows where these squares are situated. We also use

symbols to distinguish the date period of the records: since 1950, 1930-1950, before 1930. As I have already explained we believe this is acceptable in Cambridgeshire with its simple geology—an additional statement such as “in Boulder-clay woods”, “in chalk grassland”, etc., means that the user can readily refind the plant and he can also see whether he has made a new discovery of some importance.

In a more complex terrain I think it would be well worth while considering producing dot-maps of the 4-500 species involved in this group using your 3-400 units. This will enable you to discover the main types of distribution in the county. If you can afford it, of course, to include maps of each in the Flora would be ideal, but failing this—and generally the cost will prohibit it—it may be possible to include about a dozen maps as, for example, in the *Flora of Wiltshire*, representative of the various types, and to which reference may be made when describing the distribution of any of the medium species.

Summary

1. Division of the county is essential both for collecting the Data and its presentation.
2. Any division of the county is likely to have disadvantages: the advantages of adhering to the Grid system are that it gives equal areas and national co-operation.
3. Collection and presentation are different problems but it is possible to devise a system which deals with three classes of species, Common, Medium and Rare, and presents their distribution in relation to the Grid system whilst at the same time answering those two fundamental questions: ‘Where can I find it?’ and ‘Has it been seen here before?’.

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Discussion

Mr. HALL said that if in opening this discussion he was expected to disagree violently with most of what Dr. Perring has said, then he feared the conference would be disappointed. The paper presented had clearly shown that only by the systematic division of a given area, followed by properly organised field work in each division, can reliable distribution data be obtained. Furthermore, the convenience of using the National

Grid as the basis for these divisions seems to him to be indisputable. Dr. Perring had explained how the 10-kilometre square, as used for the Maps Scheme, could be broken down into smaller squares; by the use of rectangles, perhaps less convenient on the ground, a rather wider range of sub-division is possible without the use of pen and ruler. By ignoring the 10-kilometre squares altogether and regarding one's area as merely covered by a grid whose ultimate unit is a 1-kilometre square, an almost unlimited choice becomes available. However, to adopt such a course would mean some degree of incompatibility with the national 10-kilometre system, and it is probably dangerous even to suggest such a heresy in this company. Be that as it may the principle remains the same; divide your area into the smallest units you can cope with, search these systematically and you will have more reliable distribution data than your predecessor.

The advantages of the grid-square system for collecting their records have already been recognised by some of our members who are writing or revising county Floras; Dr. Perring has described the work in Cambridgeshire. A favourite unit is the so-called 'tetrad', a 2×2 kilometre square, which is being used by Mr. E. S. Edees in Staffordshire—some of us had the pleasure of seeing his beautifully kept records in July—and by workers in Hertfordshire, Hampshire, Warwickshire and Surrey. He had chosen these examples deliberately since they might be used to demonstrate the differences in detail which had been adopted. In the first three counties mentioned, what he supposed might be called the standard technique was used: all species seen in each tetrad are recorded, using printed cards, just as was done in 10-kilometre squares for the Maps Scheme. Professor Hawkes will tell you in his paper of the planned statistical approach adopted in Warwickshire. In Surrey some 300 species had been classified as 'common' and were omitted from the field record cards. Distribution data for these species are thus limited to Maps Scheme records on a 10-kilometre square basis. Had these species been looked for in each tetrad these distribution data would have been 25 times more accurate, and he thought that a great opportunity has been missed of accumulating information which would be of particular value in a county so near to London and subject to continuous change.

Having collected the data, we are faced with the second, quite distinct problem of turning them into a Flora. He was very glad that Dr. Perring had emphasised this point, since at one time he was so absorbed with the grid and mechanical methods that I feared the new Cambridgeshire Flora would be published as a portfolio of punched cards, for playing on some kind of botanical pianola. For his part, the one feature of the grid system which would bear direct incorporation into a Flora was, as already suggested, the dot-map to demonstrate significant distribution patterns. For the rest, let it be absorbed into one of the older patterns, river basins, geological formations if need be, but preferably into parishes, using these units of historical and personal interest, however bizarre their shape, to clothe our skeleton-grid of dry facts with flesh and bring it to life as a true local Flora.

Mr. Hall said he would like to end with two quotations from *The Bristol Flora* (1912), James Walter White's masterpiece, already extolled

by two previous speakers. Apart from the Gloucester/Somerset boundary, White rejects dividing his area, saying in his introduction, "It has not seemed desirable to parcel out the area into a number of botanical districts which at best would have been largely artificial, whether the attempt were based on river drainage or upon geological formations". However, those tempted to follow this example are urged to take heed also of White's final aim expressed when he says that "He has included in this compilation every noteworthy fact within his knowledge of the district". What better aim could our modern author have?

Mr. SWANN admitted that he often felt confused when he was collecting as to exactly which river valley he was in, but he had found the grid lines much easier. Mrs. LE SUEUR pointed out that the Grid lines had not been drawn to include Jersey and she thought Mr. Swann might be interested to know that they were using lines of latitude and longitude. These actually gave too tall a square for their use so they divided them up into rectangles of approximately one square kilometre.

Dr. PERRING still felt parishes were a very inconvenient unit. Obviously for the rarer species one would mention that it grows in such a place, but for the common species some sort of reference to a distribution map would be perfectly adequate. If one wished to retain boundaries, one could record the river basins rather like counties in the British Isles and mark in the river basins on the grid.

Mr. WESTRUP noted that the watersheds between the river valleys shown in the earlier Floras did not correspond with those on modern ordnance maps: thus many old records cannot be incorporated unless they are re-interpreted. There was also a discrepancy between civil and ecclesiastical parishes and the present-day wards did not correspond with old parishes in urban areas.

Dr. H. MILNE-REDHEAD did not think there could be unity between "presenting the data" and "collecting the data". The collection of data should be by well-known methods, but the presentation must surely vary according to the county, the individual personality producing the Flora, his workers and whether there were a lot of old records or other special information.

Mr. DOUGLAS SMITH thought there was an enormous benefit for the average person to use parishes as the basis for a Flora; such people would become discouraged if, when wishing to look up a plant, they were faced with a string of Grid references. The parish was the best basis for expressing it in English.

PLATE 2



Map of Warwickshire showing 1 km. squares completed (black tone) and still being surveyed (grey tone) in the autumn of 1961. The one-in-four survey was virtually completed by the end of 1961.

COLLECTING THE DATA

A description of the methods used in the current revision of the
Flora of Warwickshire

J. G. HAWKES and R. C. READETT

The methods used in compiling the Warwickshire County Flora scheme owe much to the work of R. Good (*A Geographical Handbook of the Dorset Flora*, 1948) where "Stands" of species were recorded at various points or "loci", spaced evenly through the county, and distribution maps were constructed from the data so obtained. Although Good attempted to make "stand" lists from as many habitats as possible we felt that too great an element of subjectivity was admitted here. By making an arbitrary selection of stands, mostly in natural or semi-natural habitats, one runs the risk of overestimating the frequency of the species normally found in such habitats, and of underestimating the frequency of species which occur chiefly in highly artificial habitats, such as refuse or tip heaps, gardens, waste land, etc.

We therefore decided to base our work on area recording, rather than on locus or point recording, and we chose for our unit the 1 Km. square which we designated the "basic square". We soon realized that it would be impossible to record from every basic square in the county and we modified the method by considering the squares in blocks of four ("tetrads") and selecting one square at random from each tetrad for surveying. With this method it has now been possible to record from one quarter of the county, and to ensure at the same time that the survey is evenly spread over the whole area. (See Plate 2.)

The reasons for asking our collaborators to make an intensive study of one square in the tetrad rather than to send us a list of plants taken from the complete area 4 Km² are mainly concerned with the habitat and frequency estimates that we require them to make.

In surveying a 1 Km. square collectors are asked to make at least three visits during the year and to send us at the end of the season a species list (preferably alphabetically arranged) on the special forms provided (Figs. 1 and 2). They are issued with a special card of instructions (Figs. 3-6) and are asked to give an estimate of the habitat or habitats in which the species are found and to add a note of their frequency in the various habitats. This is difficult enough to do over 1 Km² since it means that the conscientious collector should wander into every field, wood and coppice and try to survey the hedgerows, ponds, ditches, canals,

Completed List ENTERED 256

Collector's name: M. C. CLARK Basic Square No: ... 1155

Dates: ... 18th April, 6th June, 15th July; Basic Square locality:

..... Sept 1959 Hay Brook

The principal feature is a steep escarpment, apparently calcareous, covered with scrub and rough grass, a continuation of the Red Hill and Aston Grove ridge Flora used: C. T. W.

Latin name	Hab.	Freq.	Hab.	Freq.	Hab.	Freq.	Location and/or any further remarks.
X <i>Acer campestre</i>	M-hr	r					
X <i>Achillea millefolium</i>	M-ro	f					
X <i>Aethusa cynapium</i>	C-f	la					
X <i>Agrimonia eupatoria</i>	M-hr	lf	G-m	lf			
X <i>Agropyron repens</i>	M-hr	la					
X <i>Agrostis stolonifera</i>	G-r	o					SPECIMEN <i>det com.</i>
X " <i>tenuis</i>	G-r	lf	M-ro	f			<i>det com.</i>
X <i>Ajuga reptans</i>	Ws-r	r					
X <i>Alisma plantago-aquatica</i>	Ws-p	la					
X <i>Alliaria petiolata</i>	M-hr	lf					
X <i>Alopecurus geniculatus</i>	C-f	la	Ws-p	la	Ws-r	r	
X " <i>pratensis</i>	G-m	o					
X <i>Anagallis arvensis</i>	C-f	la	G-m	o			
X do <i>sap. foemina</i>	C-f	r					Conf. Mr. Readett
X <i>Anemone nemerosa</i>	M-hr	r					
X <i>Angelica sylvestris</i>	Ws-r	r					
X <i>Anisantha sterilis</i>	M-hr	r					
X <i>Anthemis cotula</i>	C-f	lf					
X <i>Anthoxanthum odoratum</i>	G-r	o					
X <i>Anthriscus sylvestris</i>	M-hr	la					
X <i>Aphanes sp.</i>	C-f	o					SPECIMEN
X <i>Apium nodiflorum</i>	WA-r	lf					

Fig. 2. A sample page of a species list for square 42/1155, arranged alphabetically, and showing the method of habitat and frequency notation. (For explanation of symbols see figs. 4-5).

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Further particulars can be obtained from the Hon. Secretary :

STUART E. W. CARLIER, F.R.E.S.,
6 Warwick Buildings,
Warwick Road,
Solihull.

Note : The holder of this card :

is engaged on the revision of the Flora of Warwickshire, sponsored by the Birmingham Natural History and Philosophical Society and the University of Birmingham. The co-operation of farmers and landowners will be greatly appreciated.

BIRMINGHAM
NATURAL HISTORY & PHILOSOPHICAL
SOCIETY
AND UNIVERSITY OF BIRMINGHAM

FLORA
OF
WARWICKSHIRE

COLLECTOR'S CARD
1954

Fig. 3.

INTRODUCTION

This card is to show Collectors the methods of recording and the information needed with each record. All records, together with specimens where necessary, should be sent to one of the Recorders whose addresses are given below, and who will be pleased to answer any requests for further information.

J. G. Hawkes, M.A., Ph.D., Department of Botany, The University, Edgbaston, Birmingham, 15.

R. C. Readett, ~~Edgbaston~~

~~Birmingham 15.~~

60 DANFORD LANE
SOLIHULL

METHOD OF RECORDING

As from January 1st, 1954, it is hoped that all collectors will record on the "basic square" method outlined here.

To obtain a reasonably accurate estimate of the distribution of each species and its range of habitat preference and frequency, the vice-county will be surveyed in unit areas of one kilometre square as shown on recent editions of the 1" O.S. maps. There are approximately 2,500 of these "basic squares," each of which will be designated by the four-figure map reference of its S.W. corner. Each collector will choose, in consultation with the Recorders, one or more "basic squares" and will note the presence of every species in that square, together with its habitat(s) and frequency. In this way the distribution of all species will be recorded evenly and objectively over the whole county.

COMPILING RECORDS

Records should be made on the special forms (see page 4) obtainable from the Recorders and should be handed in when a basic square has been completed. To assist collectors who find that the boundaries and other features of their basic squares are not defined sufficiently on the 1" map the Recorders have two sets of 2½" to the mile maps of the county on which greater detail is given. These maps are available at the Society's Rooms and at the University, and tracings may be made from them.

COLLECTOR'S RECORDING SHEETS

These should be filled up as follows :

A. Data to be placed at the head of each sheet :

1. Name of Collector.
2. Basic square number (i.e., Nat. Grid reading of S.W. corner of the square).
3. Basic square locality (Name of any place within the square that may be used for identification).
4. Dates at which square was visited. (At least three visits, preferably in Spring, early Summer and late Summer, should be made).
5. Flora used. (It is strongly recommended that the new Flora by Clapham, Tutin and Warburg be used, but this is not essential. The name of the Flora used and a note of the edition are essential).

B. Plant Records :

6. Latin name of species.
7. Habitat and frequency. (Since the species may be found in more than one habitat, three columns are provided together with corresponding frequency columns.)

(a) **Habitat** : The signs to be used are :

1. WO = Woodland
WO-c = conifer wood
WO-m = mixed wood

Fig. 4.

(b) **Frequency :** Collectors are asked to use these symbols :

a—abundant o—occasional
f—frequent r—rare

The categories “a” and “f” may be prefixed with the letter “l” to denote “locally abundant” and “locally frequent” respectively.

Where it is thought desirable to record that a species is “dominant,” or that two or more species are “co-dominant” in a particular area, a note of this should be made in column “c : Location and/or any further remarks.”

It is important to note that frequency should be estimated *for the particular habitat in which the plant is found*, not for the square as a whole. For example, *Hedera helix* may be abundant in “mixed wood” but not found in other habitats. The correct entry will be “WO—m : a” (*not* “WO—m : la.”)

The estimation of habitat and frequency may be recorded quite simply from the collector’s general impressions when walking through the basic square on which he is working.

(c) **Location and/or any further remarks :**

In this column the Collector may make any additional notes. If the species in question is rare and confined to one place or to a restricted area, the exact locality or a six-figure National Grid reading may be given. Further particulars of habitat may also be added : e.g.—

Topography : hili, slope and direction.

Soil type : clay, sand, peat, etc.

Woodland : coppice, clearings, etc.

Meadow : whether grazed or cut for hay, etc.

WO—o = oak wood
WO—sc = scrub or derelict wood

2. WS =

Waterside

WS—c = canal-side

WS—d = ditch-side

WS—l = lake-side

WS—m = marsh

WS—p = pond-side

WS—r = river-side or stream-side

3. WA = Immersed in Water (with WA—m,

WA—c, etc.)

4. H = Heath, etc.

H—b = bog

H—d = dry heath

H—g = heath grassland

5. M = Marginal

M—hr = hedgerow

M—ro = roadside

M—ry = railway embankment or cutting

M—wa = wall

6. G = Grassland

G—m = meadow

G—o = orchard

G—p = pasture

G—r = rough grassland

7. C = Cultivated Land

C—a = allotment

C—f = cultivated field

C—g = garden

C—p = public park

8. RU = Ruderal, Waste Land

RU—b = brick or marl pit

RU—f = farmyard

RU—q = quarry

RU—w = waste ground, tips and refuse dumps

Fig. 5.

EXAMPLE OF RECORDING SHEET

Collector's Name : J. Smith. Basic square No. : 2396.
Dates : 6-3-54 Basic square locality : Sybil Hill.
15-6-54
10-8-54 Flora used : C.T. & W.

Latin Name	Hab.	Freq.	Hab.	Freq.	Hab.	Freq.	Location, etc.
Ranunculus acris	G-m	a	M-hr	If	M-ro	o	grazed meadows
Rubus sp.	M-hr	o	WO-m	If	RU-w	a	
Orchis fuchsii	WO-m	r	(damp clearing)				specimen enclosed

*Polygonum aviculare agg.

*Rumex

Ulmus

Salix

Epipactis

xOrchis subgenus

Dactylorhiza

†Jurcus

Potamogeton

†Carex

Agrostis

Poa

Festuca

Bromus

x†Sagina

*Montia

†Prunus

Rubus fruticosus agg.

Alchemilla

Aphanes

Rosa

†Sorbus (except aucuparia and terminalis)

*Callitriche

Epilobium (except hirsutum)

*Oenanthe

Centaurea

Hieracium (except pilosella)

*Taraxacum

*Specimen should be in fruit.

†Specimen should be in fruit if possible.

xFresh material is desirable.

NOTE :

1. Any collector having difficulty with the identification of plants not in any of these groups is invited to send specimens to the recorders, who will be pleased to assist.
2. If a plant is found which the collector believes to be a new county record, he should send a specimen to the recorders with detailed notes of the locality, etc.
3. The presence of Betula, Crataegus and Quercus spp. should be recorded ; but they will be the subjects of special studies.
4. Details have been prepared of the minimum requirements of specimens for determining particular critical groups. A copy will be supplied, on request, to every collector.

CRITICAL GROUPS

For all critical groups (see below) one of the following procedures may be adopted :

- (a) The genus only may be stated (e.g., *Rosa*, *Rubus*).
- (b) The species may be noted in the aggregate or wider sense (e.g., *Ranunculus aquatilis* agg.).
- (c) An attempt at identification may be made.

The Recorders would like specimens, if possible, to support the records under (a) and (b). Specimens are *absolutely essential* if procedure (c) is adopted.

GROUPS OR SPECIES FOR WHICH SPECIMENS WILL BE NEEDED TO SUPPORT A RECORD

Any new vice-county record, and :
†*Ranunculus* subgenus *Batrachium* *Symphytum*
†*Fumaria* †*Euphrasia*
Viola *Rhinanthus*
†*Polygala* *Mentha*
†*Cerastium* **Chenopodium*

Fig. 6.

Figs. 3-6. Flora of Warwickshire Collector's Card, with brief instructions on the methods of field recording to be adopted.

shall make a point of checking the old records before the end of the survey to see whether the rarer species are still to be found growing in their old haunts.

When the lists are sent in they are carefully "screened" and doubtful records checked with the collectors. Voucher specimens of species belonging to difficult groups are brought in by the collectors in most cases and these are checked by us at the time or after sorting. When the scheme started we sent sets of specimens to national experts for naming and this we still do when we feel it to be necessary. However, with the named sets in front of us, and with an increasing knowledge, we have ourselves taken responsibility for naming the more straight-forward material since if we had not done so the national experts would have become completely inundated with material from Warwickshire.

The data from the plant lists are transferred to species cards (see fig. 7) of which there is a separate series for each 10×10 Km. Grid square. The species cards are ruled with a grid of 100 one Km. squares at the scale of 1" to the mile and the records of habitat and frequency are entered in the correct spatial relationship. Each card is thus a stylized 1" to the mile distribution map for a particular species in a particular 10×10 Km. square. By placing all the cards for a given species together in the correct order we can construct an interim distribution map of that species for the whole county (see fig. 8 for a portion of the N.W. corner); thus at any time we can check our records and remove anomalies from the maps, think about the reasons for certain distribution patterns and ask for additional data or observations from our collectors—all this before the final maps are drawn up.

Since we have now finished the "basic square" recordings and are about to embark on a one or two years' period of checking through the records in the field, the value of our map-index cards will be at once apparent. A blank space on the index card *may* indicate that the species was absent, but it could mean that the collector did not visit the square when the plant was in flower, or alternatively that he was not able to recognize it. Most of us have "blind spots" in our knowledge of plants, but it is obviously most important that these blind spots should not be represented on our distribution maps!

For this reason we are planning the final 1-2 years' work on record checking; we shall also be asking our collectors to look for the rarer species, whether within the random squares or not, that are known to have been found some time before the beginning of the present survey (1950) but have not been seen since.

In publishing the Flora we hope to produce a volume of distribution maps of all but the rarer species, in addition to a volume of text. On each map we hope to show, not only the presence of the species in question in all the squares for which it has been recorded, but also the habitat or habitats in which it has been found. To do this we have proposed a series of symbols (see fig. 9), each one representing one of the major habitat group-

ings. Since a species may occur in more than one habitat it is important that such symbols should not be mutually concealing and that two or three can be placed over each other on the same square without loss of legibility. Furthermore, the symbols should be easily recognizable at a glance when viewed on the map as a whole and it should not be necessary to refer to their position *within* a square to interpret their meaning. Unfortunately, we have not yet been able to devise a system showing frequency as well as habitat. Nevertheless it will be possible to get a general idea of frequency by noting the number of squares in which a species occurs compared with the blank squares in which it has not been recorded.

SPECIES _____										MAJOR SQ. No. _____									
0		1		2		3		4		5		6		7		8		9	
																			9
																			8
																			7
																			6
																			5
																			4
																			3
																			2
																			1
																			0

Fig. 7. Species Index Card. This represents an index card and distribution map for a single species in a 10 × 10 km. square, on which the records of habitat and frequency can be entered in the correct spatial relationship. For further explanation see text.

	WO	Woodland (including scrub and derelict wood)
•	WS	Waterside (including fresh water marsh)
—	W	Water
△	H	Heath (including bog and acid grassland)
○	M	Marginal (hedgerow, roadside, etc.)
/	G	Grassland (excluding acid grassland)
\	C	Cultivated land (arable fields, allotments)
□	R	Ruderal (waste ground, rubbish tips, etc.)

Fig. 9. Map symbols representing the major habitat groupings.

A sample map for *Urtica dioica* (fig. 10) is shown below, in which the preponderance of marginal records (hedgerow, in this case) is clearly visible.

The published volume of maps will contain transparent outline maps on the same scale as the species distribution maps, giving information on soils, surface geology, urbanization and communications, etc. It will thus be possible to place these over the species maps and to draw further conclusions about their distribution.

Since the choice of 1 km. squares surveyed was based on a random selection in each tetrad it will be possible to make use of the habitat data from them for a mathematical analysis of species preference for, and spread into, certain habitats. This would not have been possible if we had chosen squares from the tetrads that seemed "interesting", since our picture of the habitat preference of the species would then have been biased. We hope to be able to publish a separate volume of text in which these habitat studies and other data of interest are included, together with the usual introductory surveys of topography, geology, history of botanical work in the County and other matters.

This survey has engaged the sparetime efforts of quite a large number of botanists from Warwickshire and elsewhere, both in the field and the herbarium. Without their help we could not have begun this Flora, much less bring it to its present stage, and we should here like to express our thanks to them for all the enthusiastic co-operation we have received.

WARWICKSHIRE COUNTY FLORA

DISTRIBUTION OF *URTICA DIOICA*



Fig. 10. Interim map showing the distribution and habitat of *Urtica dioica* in Warwickshire.

Discussion

Dr. S. M. WALTERS opened the discussion by congratulating the Warwickshire botanists on the energy and enthusiasm which they had shown in collecting data for this ambitious county flora survey. He said that there was much that Professor Hawkes had said in his admirably clear account which invited discussion and comment but he was selecting only three points. He thought the attempt to collect habitat and frequency data was very laudable and showed a greater faith in the ability and willingness of botanists to provide such information than the Society's Maps Scheme had shown, and he wished to know whether they found much difficulty in collecting or interpreting the data? Secondly, Dr. Walters expressed an interest in the interpretive text which it was planned should be included as the text volume of the Flora, and he wondered how far the Editors thought of going in this direction? Lastly, he sought further information on how serious the problem of access to private land had proved in such a detailed survey.

Professor HAWKES replied that in estimating frequency there was obviously a subjective element and he did not see how it could be otherwise. He thought it would be agreed that all these estimates have to be an approximation and short of doing a detailed ecological survey there was no alternative. They realised that there may be some discrepancy but would this matter very much if the final estimates are expressed in the following form: i. Frequent to abundant; ii. Rare to occasional. He felt that in the end a true picture would be obtained and slight errors and inconsistencies would cancel out. Another way of arriving at frequency was to see how many squares a plant had been recorded from and how many times it had been recorded.

Replying to the question concerning access to sites, Professor Hawkes said that some people had experienced difficulty and some people had seen the landowners beforehand. They had found that the nearer they were to Birmingham or Coventry the more difficult it was, while further into the country it was a great deal easier. Mr. READETT said that sometimes it had been helpful to show collecting cards.

Professor Hawkes concluded his reply to Dr. Walters by stating that the interpretation which they intended to include in the second volume would only be that which came within the scope of the Flora to assist those using the maps which would constitute the first volume.

Dr. DONY asked when was a square considered to be complete?

Professor HAWKES pointed out that they did not normally accept a list with less than 100 records unless the square was in a built-up area. Probably most squares in Warwickshire contain from about 200-350 species according to location. They do not ask people to obtain the very last record from a square since there comes a point in the survey of a square when the time spent is hardly commensurate with the extra number of species to be found.

Mr. READETT added that there were fewer species from the eastern squares than from those in the west which was probably due to historical factors. The Forest of Arden, in the west, which had been lost relatively recently was a particularly rich area; whereas in the "felden" district where the squares were under an open field system of agriculture in Saxon times and have been cultivated ever since are often very poor.

PROBLEMS OF IDENTIFICATION

C. C. TOWNSEND

We have now reached approximately the halfway mark in this symposium, and have already heard a great deal on the work involved in a local Flora; this, and what is to come, demonstrates that the author of one must be a man of considerable ability. He may be a good critical botanist (e.g., C. E. Salmon, or J. W. White—whose stature is indicated by the fact that I am the fourth speaker to hold his work up as an example quite independently), or he may be average but with the ability to co-ordinate the efforts of those whom he may call upon to assist. Certainly there is kudos attached to one's name as the author of a local Flora, but only if it is a good one, and in these days when botanical work in Britain is so intensive, errors and inadequacies will not be long in coming to light.

The author of a local Flora is unlike the author of a national Flora. Because he is studying and recording for a smaller area in greater detail he has to enlist and use to the best advantage a very diverse group of people, in much the same way that the Maps Scheme has in recent years. Some may be very good botanists—better, indeed, than the author himself, but either with consciousness of no talent for organisation or else with no particular taste for the job; some may be schoolteachers or schoolchildren or ordinary flower lovers with little interest in critical taxonomy but willing to collect, attempt determination and submit specimens for checking. These present problems, and it is here that our author will use his referees. At this point we must define a referee. Really, he is not unlike a football referee—he gives judgment on an action performed, in this case the identification of a plant. He is NOT someone to whom plants may be sent to save the collector the task of naming them himself. Thus, the author of a local Flora should encourage all his correspondents to at least have a go at their plants before sending them to a referee. In this way he will in the end save himself work as his helpers grow in the knowledge that effort brings, and keep the co-operation of his referees. The keenest referee is deterred when someone continually sends in specimens with no apparent signs of effort on his own part, particularly when the same thing returns time after time after time. There is no need to conceal one's attempt through shame, for all referees have at one time or another used referees themselves and made the same mistakes which their correspondents will make. It is this fact that makes them qualified to help. The job of a referee is to tell a correspondent, if he is wrong, *WHY* he is wrong. This

he cannot do if the correspondent does not give his tentative determination.

What is the biggest difficulty which a referee has to face in making an identification? There are many which will come to mind as causing trouble—the natural phenomena which breed critical groups. Apomixis; abrupt geographical separation associated with slight character differences; prevalent hybridisation; extreme plasticity in response to ecological conditions. But the average referee will, I am sure, agree that next to his own ignorance of his group (so commendably admitted by Edees in his paper on “The difficulties of a *Rubus* referee), the chief trouble is simply—inadequate material. In fact, it often seems to me that the reason a correspondent has sent a specimen to a referee is that the specimen is too inadequate for him to name himself but he is reluctant to throw it away. Thus another job of the author of a local Flora will be to advise on collecting; to point out to helpers who go about in twos or threes that if, for instance, a casual is found, one person should take the whole plant*. It should not be torn asunder to provide a piece for each member of the party and thus create extra difficulties, perhaps insuperable, for the referee who has to examine one of these scraps. Likewise, if it is required to show a mystery plant to the author, it should be pressed first; then if it proves necessary to refer it to a referee, he will not have to look at something resembling boiled cabbage or dried herbs. The irremediable scrap collector of the Kniphof school is of course usually the type who collects plants as others collect postage stamps—to have a new name in his collection either as a specimen or as a name ticked off on a list. Our author may find that to encourage him is more trouble than it is worth.

There is another preliminary difficulty with which our author may deal. Opinions vary as to difficult groups. Once I gave a talk to a local Natural History Society in which I observed that perhaps the easiest of the larger families in the British flora is the Umbelliferae. The subdued chuckle which greeted these words is with me yet. But it is so, and I would suggest that the reason why many plant lovers find difficulty with them is the use of unsuitable literature. It is very plain that in a group where the members are similarly umbellate and mostly white-flowered, the plant-lover whose books consist mostly of pretty pictures, perhaps running to several volumes and expensive, perhaps grouped according to colour, is soon going to be in trouble. I started off with H. G. Jameson's *Trees and Flowers of England and Wales*, with no plates but with thumb-nail sketches illustrating the salient points in artificial keys, which encouraged accurate observation of characters. This cost me the princely sum of 3s. 6d. and I had little difficulty with the Umbelliferae from my earliest days. Our local Flora author, then, may give advice on literature to the rawer of his helpers and thereby in the long run save

*If there is only one specimen of any plant other than of casual status, it should not be collected by anyone.—ED.

himself work. At the very beginning is a very good time, for the prospect of being engaged on a definite project will often turn a diffident worker into a keen one.

Having thus disposed of the preliminaries, what of the difficulties inherent in the examination of the plants themselves, assuming them to have been well collected and preserved. These are, broadly speaking, of two kinds:—

(a) Difficulties caused by the taxonomists who have dealt with the group.

(b) Difficulties caused by the plants themselves.

The first is not necessarily inseparable from the second, nor is it perhaps as rare as we would like to think. Anyone who has tried to name his British *Erophila*, for instance, from Druce's synopsis of continental treatment applied to British material, or from the continental treatments themselves, will know what I mean. This problem will be bound up with the scope of a local Flora and the desirable degree of splitting. In many groups the treatment even in standard works such as C., T. & W. is not altogether satisfactory. It is not uncommon, however, for a referee who has named a plant for a correspondent to receive a plaintive letter saying: "But it does not agree with the description of this species given in" Or, where the treatment of a group in a new Flora differs from that of an older one, the postage stamp botanist who is unwilling to forego the pleasure of an extra name on his list may try to persuade the referee to give the name of a "split" by now known to be spurious. In the revised B.S.B.I. Panel of Referees it will be indicated that although the list is given in the order of "Dandy", it must be pointed out that the referee does not necessarily agree with the treatment of his group in either Dandy or any other publication. This is necessary, as botanists are now interested in plants, not names, and it is to be expected that the current trend towards the sinking of worthless species and varieties will continue for a while. What then of the referee who is recruited for a local Flora but whose views differ radically from current taxonomic opinion as represented by, for example, Clapham, Tutin and Warburg? Is the local Flora the place for the description of new taxa or revisionary work (e.g. the publication of *Epipactis cleistogama* C. Thomas in the *Flora of Gloucestershire*)? I would say emphatically not. Even for the professional botanist who has a comprehensive library at his disposal the descriptions of new taxa are already scattered through too great a volume of literature for comfort, and it is essential that novelties should appear in as limited a number of publications as possible. Likewise, the literature is cluttered up with quite enough double citations of the "in" and "ex" variety. I would suggest that if any specialist proposes the publication of a new treatment or a new taxon in a local Flora, the author should politely decline to adopt these unless at least a preliminary account appears in *Watsonia*.

Now for the difficulties provided by nature. It is sometimes asked, "Are you a splitter or a lumper?" And sometimes, most regrettably, this straight question receives a straight answer, thus betraying a preconceived position and giving the lie to the scientific integrity of the answerer. The only true answer is of course that each case must be considered on its merit. Let us consider first perhaps the most famous cause of critical groups, i.e., apomixis. In the September (1961) issue of *Taxon*, G. D. Rowley has this to say:

"Apomixis is just another means of vegetative propagation of covering a wide area with the same genotype in a short period of time. We do not make a special case of bracken, because it can cover a whole hillside with one clone, or of Dog's Mercury because a woodland may be filled with a single colony only. The species concept is debased by giving a separate binomial to every apomict. Look at the chaos it has caused in *Rubus* and *Hieracium*".

So apomixis is just another form of vegetative reproduction, giving binomials to whose exponents causes chaos. Yet one is tempted to wonder whether the writer has spent as much time on *Rubus* as did Watson when he denied the existence of the "fabled swelter of intermediates", or Edees who says in the paper previously referred to that "the majority of *Rubus* spp. are clearly defined"—which is as much as can be said for many non-apomictic species. It appears to me that for the present the taxonomic chaos resulting from the naming of distinct apomicts is much less than that which would result from the lumping of morphologically and ecologically separable plants such as *Rubus ulmifolius* and *R. vestitus*, *Hieracium exotericum* and *H. vulgatum*, to use common species as examples. If we are to say that because by normal taxonomic treatment a group becomes highly involved, therefore we must stop it becoming involved by altering our treatment, rather than accepting the fact that nature is involved, we are going to find ourselves in a decidedly queer position. Similarly, to make such a generalisation we need to assume that the small species of *Rubus* only reproduce apomictically, which is certainly not the case with the two mentioned above. Likewise, although we do not name clones of bracken, we certainly do in other groups (e.g., *Salix*, *Ulmus*), and it is hard to see how this can be avoided. Morphological differences between a tremendous number of apomictic species may be greater than between many normally sexually reproducing species; and until it is demonstrated that one method of character fixation is more important than another, it seems to me that the apomicts must receive recognition.

Another great cause of difficulty is of course the apparent lack of genetic barriers which gives rise to frequent hybridisation. It has been pungently observed that in many cases where lack of genetic barriers has been claimed the real situation would appear to be lack of species. But in *Salix* and *Epilobium*, for example, such is not the case. I must agree with what Dr. Peter Raven

said to me recently, that botanists have developed such a phobia about hybridisation in *Epilobium* that they are almost more ready to believe that any one example is a hybrid than that it is a pure species, and that in fact the frequency has been much exaggerated. Many times I have been in spots where many species have been present in abundance, but not seen a single convincing hybrid. Nevertheless, they are reasonably frequent, and in this and other such genera I believe that there is no room for opinion as to whether they and their products, however involved, should fall within the scope of a local Flora. They are real elements of the floral population and must be included. It may be said that these critical groups take up a lot of room, but against this I would make these points:

(1) A local Flora must be a good one. If it is not, it were better not done at all. The days when a mere list of plants with a single-name locality could be published under the pretentious name of "Flora" are surely over. I say this even as a supporter of the traditional type of Flora such as those of Gloucestershire or Wiltshire.

(2) A Flora, unfortunately, has got to sell, or someone feels the pinch—perhaps a publisher who will thus not venture on such a commitment again. Since, as has been observed, most serious interest in the British flora is now in these groups, I feel that if anything they must be stressed at the expense of the more straightforward groups if the Flora is to sell at all well.

I would like to touch on the vexed question of chromosome number. There are, of course, two extreme views on the significance of this in taxonomy, and they were expressed as follows at the recent "Flora Europaea" round table conference in Vienna, April 1-7, 1959.

(1) *Askell Löve*—"Taxonomy and chromosomes—a reiteration".

"The only logical rule for the classification of taxa differing in chromosome number is to name them as distinct species".

(2) *Rothmaler*—"Taxonomy and genetics".

"Every single species is defined by a certain number of characteristics, including its area and ecological behaviour. In my view it is quite inadmissible to accord any greater or deeper importance to the characteristic chromosome structure or to chromosome number. Not only the methods we apply, but the facts, too, give proof that number and structure of the chromosomes can vary as much within a species or subspecies as they can remain constant within a big genus or even parts of families. For this reason, I do make use of chromosome number as a valuable aid to the definition of taxa and for their status but I cannot lend it greater importance than I would give to any character of the exterior or interior morphology".

The latter is my position exactly. Löve goes out of his way to cite instances where "chromosome species" have been named in the past by critical workers using traditional methods which had revealed small morphological differences, and here the relevance of this matter to local Floras is revealed, for an example which he cites is *Callitriche platycarpa* Kütz. This species is not included in the current British Floras but has been distinguished in this country by a least one specialist. The author of a local Flora will have to make up his mind as to whether he will include species which would scarcely receive recognition but for the "confirmatory evidence" of chromosome number. Löve's statement may be conceded up to a point. But he does not convince because he does not deal adequately, if at all, with firstly non-apomictic micro-species which are distinct but have the same chromosome number (cf. the work of Yeo on British *Euphrasia*), or secondly totally different species with the same number as shown by the work of Hambler on British *Orobanche*, where both species of section *Trionychon* and six (possibly seven) of the section *Osproleon* were found to have the same number. Thus I believe that there are a great number of questions to be answered before taxonomists launch into such a wholesale production of new combinations and species as seemingly advocated by Löve on chromosome number alone. It is, of course, quite possible that the author of a local Flora will have to consider unquestioned new taxa arising subsequent to the publication of the current standard British Flora, just as the two species of watercress, although perfectly distinct, remained undistinguished for so many years. But where a species receives recognition by only a minority of taxonomists holding extreme views concerning the significance of chromosome number, it seems advisable not to adopt it.

It may be said that I have dealt with general principles rather than with difficulties of identification at the local Flora level. This has been quite deliberate. I do not believe that the author of a local Flora can be a nonconformist. The local Flora bears, as it were, the same relationship to a national Flora that a six-inch Ordnance Survey map does to a one-inch map. The same broad outline is there (though I believe that I have made it clear that I do not intend here that the conformity should be to any ONE national Flora throughout), but there is room for more detail: and it is in detail that these concepts which have been dealt with are shown in sharpest relief.

Lastly, a word on the casual alien. It is undeniable that there is a very considerable interest in these plants currently. Here the difficulties are, of course, merely limitations of facilities and knowledge of the literature. No one but the professional or the amateur with access to a large herbarium will be able to do much with them. As to their place in the local Flora, I believe that they should be put in their traditional position—an appendix in small type. They could be called "interestingly unimportant", and I cannot help but feel that although they have some few serious

students, their main appeal is to the postage stamp botanist who has run out of native plants. When, of course, a plant is believed to be permanent, and/or if it may be overlooked for a native species—an incipient *Epilobium adenocaulon*, perhaps—it is a very different matter, and such a plant could be given equal prominence with the denizens.

I have not dealt at length with ecological variation since, where referees are employed, ecovars. will not often present great difficulty to the man who has really worked at his group in the field and experimentally—just as although *Juncus bulbosus* may perpetrate the most absurd disguises which are confusing at first, it rarely deceives anyone who knows it well.

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Discussion

Mr. E. L. SWANN opened the discussion by saying: "We have listened to a most interesting paper from a professional botanist on the problems of identification. He compares a botanical referee to a similar gentleman in a football game. I think that is putting too high a value on him, for the football referee is not only in complete charge of the game but also has the power to order a player off the field. Rather would I compare him to the linesman who is occasionally consulted by the referee and this gentleman may take his advice. The operative word is "may" for I am probably one of those nonconformists the speaker frowns upon. For

example, as a result of many years' field-work with the willows, my treatment of them would run somewhat differently from the usually accepted opinions. My sympathy is with the referee, for far too often he has such inadequate material on which to base his opinions. To know the willows one has to live with them all the year round. You may recall what the famous Norfolk salicologist, Sir J. E. Smith, said about them in his *English Flora*, "No botanist can be competent to form an opinion about them, unless he resides among the wild ones, for several seasons, or continually observes them in a garden". To this day Smith's account of this interesting but puzzling genus, after making allowance for his denial of hybrids, remains one of the best. Again, in a recent book one of the Cruciferae, *Hirschfeldia incana*, was enclosed in square brackets purporting to be one of the taxa occurring in the Channel Islands but not known as an established member of the flora of the British Isles. I was reminded of this only last Sunday when during the course of a ten-mile walk in Breckland I was rarely ever out of sight of this plant and it has persisted there for many years.

The speaker rightly stresses the fact that a county Flora is not the place for descriptions of new taxa. Yet when the last Flora of Norfolk was published in 1914 a reviewer deplored the omission of short descriptive or critical notes which often lend more than a local value to such works and which indicate observation of a higher type than a mere record conveys. I think that such critical notes are of importance for visiting botanists to assist them in finding a plant's name, for this testing in the field of a local Flora is the merit of its worth.

In his emphasis on critical groups, the speaker said that they must be stressed at the expense of others if the Flora is to sell at all well. I wonder if critically-minded botanists constitute the largest group of buyers. Rather would I think that the biggest sales would be to those botanists, actual or potential, who, in the case of Norfolk, would want to know just what plants they might expect in, say, our three classic habitats, Breckland, the Broads, and the north Norfolk coast.

My experience with the genus *Epilobium* is different from the speaker's. My field-studies show that where two species grow together in some numbers then a hybrid or two will usually be found. For example, in marginal woodland where *E. adenocaulon* and *E. montanum* so frequently grow together their hybrid will be found; in fact, it can usually be spotted from a distance by reason of its characteristic hybrid vigour. We find *E. adenocaulon* a powerful pollen parent in West Norfolk.

I am glad that there is a saving grace for the fashionable rubbish-tip alien when it is found to be permanent. Visitors to the north Norfolk heaths are amazed at the abundance of *Acaena anserinifolia* where it arrived from a rubbish tip near Sheringham some forty years ago. Such places can become centres of distribution.

We struggling amateurs are becoming so clamped down by the tyranny of specialisation that I am tempted to point out that a species is not established by Divine Authority but represents only a group of organisms which we put together for our purposes. If a species is so difficult to recognise that only one expert can do it, its usefulness is lost, like a language that only one man can speak. Similarly, if there are too many intermediates between one potential species and its allies, convenience is

lost. Let us, therefore, have species that any competent botanist can differentiate”.

Dr. WALTERS said that he must agree with Mr. Swann that the species should be a useful unit which any competent botanist can distinguish, but he did not think that this necessarily clashed with what Mr. Townsend had said.

Mr. TOWNSEND replied that he believed that Mr. Swann in fact answered his own question by observing earlier in his remarks that his knowledge of the willows was based on many years' experience and to get to know them one had to live with them all the year round. This was the same with all critical groups. It is rather like the difference between a simple sum and a problem involving differential equations. Because the mathematician takes longer to do the latter it does not mean that the problem is less legitimate or the mathematician incompetent.

Mr. D. ALLEN said he had long felt that the referee system breaks down in one or two cases, particularly with brambles and roses. The average collector can do best by just collecting at random and sending the specimens into a central referee. He thought that in one or two cases it was imperative that the compiler, or someone working on the Flora, should specialise in difficult groups.

Mr. PHILCOX stated that he would like to support Mr. Townsend's request for abundant material for identification and he wished to add that the referee must also be sent adequate data.

Professor HAWKES agreed with Mr. Allen that someone should make themselves responsible for certain critical groups in the county and he thought it essential for a Recorder in charge of a county Flora to have at least some knowledge of such groups so that collections of the right sort of material could be made. Without knowledge of these groups it would be impossible to make collections of them since the eye normally does not see variation of this type if such variation is previously unknown to the observer.

Mr. PALMER wanted to know what one did when one got a discrepancy between the opinions of two experts?

Someone replied that it may be the fault of the plant.

Mr. TOWNSEND pointed out that one should be quite certain that the referee had given a definite name. There had been cases where, in spite of a referee making some qualifications, the correspondent had published his record as a firm determination. This was strongly to be condemned. Where two differing positive names had been given, his first remark that Edees was right in stating that a referee's first difficulty was his ignorance of his group should be remembered. The two referees should be notified of the discrepancy and left to sort it out between them—no doubt to their mutual advantage.

Another speaker suggested that in fairness to both experts, it is advisable to inform each one that the other has received a similar specimen.

Dr. WALTERS did not think Mr. Palmer should be upset about telling the experts that they disagree over the same specimen. When he had been involved in such a case he had found that a different opinion is often of value to him.

Dr. PERRING closed the discussion by pointing out that there are many specimens which are wrongly named in many herbaria.

OLD RECORDS

DAVID McCLINTOCK

When I was asked last April if I would give this talk, I protested that I knew no more about this subject than the man next door. My only credentials are that I have been more or less closely concerned with the projected Floras of Kent and of the Channel Islands, particularly the latter. I shall draw my examples chiefly from their three vice-counties. I take it that this aspect of old records is merely part of the all-out effort that must be made to assess correctly the identifications and status of the plants in the area, and that 'old' records does not solely mean very old ones.

The first task is to find the old records. There are very few areas in Britain of any size which have not some sort of Flora or list which provides a starting point. Many of these Floras, excellent ones too, were written before most of us were born—the vintage period, after all, ended over half-a-century ago, and the rate of change since then has been far more rapid than ever before. However, an existing Flora—or the records of the Maps Scheme must be the obvious starting point. Then there are standard works and periodicals which need searching; and if one is lucky enough to come across copies of any of these works annotated by someone concerned with the area, this can prove useful. Perhaps more might be done by discovering where the libraries of former workers went to. It is also worth-while knowing who has recorded plants, with or without making gatherings from the area concerned. The chance specimen more than once has shown that someone unsuspected had collected in the Channel Islands and led to a search, or request, for his list or herbarium specimens.

In any event, the various herbaria which are likely to contain specimens from one's area, need looking through, and the next best to seeing the plants actually growing is a correctly named, localised and dated herbarium specimen—characteristics of by no means all herbarium specimens! In this, we now have the valuable assistance of D. H. Kent's recent book. Herbaria—public and private—need searching not only for hidden records, but for checking critical or dubious ones already in print, or otherwise heard of. Even when doubtful ones are made by a redoubtable recorder I have found that they are rarely supported by a specimen. Mrs. Frances le Sueur keeps a card index for Channel Island plants, and on it she notes the whereabouts of *any* specimen we know of which has been collected in the Islands. Thus we should know at once where to lay hands on sheets of

any given plant which research makes critical, thus enabling the old records to be correctly assigned. It is not only in the Channel Islands that there is occasional doubt that a given specimen is correctly labelled, but there the problem is probably somewhat greater. The reason is that otherwise reliable gentry in the past really did not know the difference between Jersey and Guernsey and, when sent a specimen from one, were quite liable to label it as coming from the other. We also, I suspect, suffer from visitors (the Channel Islands have to rely largely on visitors for their records) who dashed over, collected freely, and returned without clear notes as to which island which plant had come from. Many herbaria do not have their specimens arranged conveniently for turning up the plants from any given vice-county. In the Natural History Museum, fortunately for the would-be compilers of a Flora of the Channel Islands, their plants are almost invariably on top of the folder. But whatever system is adopted, a thorough search, is, I find, almost always rewarding. But it does demand an immense expenditure of that scarce and precious commodity, time.

It is important that all records, however ridiculous, that have found their way into print, be accounted for. This is a bane for compilers of local floras, but if one does not do so, someone is sure to complain that this or that record has not been dealt with. And when there is a published record, it is wise, as with all quotations, to trace it back to its source, partly because errors can crop up in copying, and partly because so often the original source produces fresh information.

Then having found the records, there is the important process of assessing and checking them. This is automatically harder with old ones because the person who made them is most unlikely to be still available, or usefully available, for questioning. Identifying pre-Linnean Latin names of plants is a form of knowledge for which most of us have to rely on the specialist, but they are not infallible—Dr. Rose recently rewardingly reinterpreted T. Johnson's two journeys in N. Kent. Old English names can be very confusing. Only the other day I discovered that the same word was used for Catmint, Lavender and Turnip flowers.

In assessing records, one should try to get a line on the sort of people their recorders were. There is the standard book by Britten and Boulger; and many existing Floras include short biographies of their main contributors. But we must not be blinded by a person's subsequent reputation. In the Channel Islands we have quite a crop of unrepeated records made by the august C. C. Babington himself, but the fact is that he was then young and a long way off being a professor. In any event, I must stress that absolutely anyone is liable to make a slip, and one must never be put off by the eminence of the recorder into accepting what otherwise seems improbable. And I may say that this is even harder when the eminent recorder is still alive.

But even taking everything into account, there will still be some records that appear startling and yet are true. Many subsequent Floras, or supplements, or check lists, provide examples of plants that have been rejected and subsequently confirmed or refound. Pity, therefore, the compiler of any Flora in trying to know what to accept or reject.

In their accounts of each species, a great many Floras detail the first record in the area, the first that is for 'standard' plants, aliens being frequently and repeatedly considered unworthy of this. Some differentiate between record and first mention, or first evidence, or first found, or give the first record and not an earlier specimen, and some give no reference to first records at all. These fine distinctions I consider of no importance. What presumably matters is the first reliable evidence, whether or not it happens to have been published before. But first records any way—of garden plants too—can be over-rated. You will find plenty of examples in Floras of perfectly ordinary plants "first recorded" only in the last century, whereas much scarcer plants were first recorded there long before. Yet nobody seriously suggests that most of the former are recent arrivals, whereas the rarities have been there all that longer. If one is going to have first records, one should be prepared also to have last records—and you will find in the check-list for Herm, that Mrs. le Sueur and I have included last records as well as first, for plants which have not been seen recently. But last records are harder to come by than first—those of you who watch birds will have had this difficulty over the last of the migrants to leave. No doubt many plants have had several introductions, and it may not at all be the first one which successfully established, or re-established the plant—if it is established. 1730 and 1817 are both given as the dates of introduction of Snowberry both are true, but it is said to have died out between the two dates.

My remarks hitherto, have been largely confined to what I take to have been the old restricted, rather cosy practice. I hasten to say that recent floras show more freshness. For the rest of my time I am going to make various suggestions for enlarging the the scope of our assessment of records. Mark you, I am well aware that much of what one gets this way may be little more than clues, in particular because of the difficulty of being quite sure, of the exact locality or of the precise plant, and much will relate to obvious plants, notably trees. But it must help to be aware of the countless factors which have affected our flora over the ages, especially in the status of apparent newcomers. Indeed, it is the apparent new-comers that have been far too rigorously rejected and we suffer from the paucity of records for many of them.

I suppose geology must come first of the outside sources since, after all, the surrounding and underlying rocks and soils can be of literally basic importance to the flora. Dr. Rose has made successful forays by relating geology and plant distribution in Kent, for example, with the Greater Horsetail and the Alternate-leaved

Golden Saxifrage; and by plotting the stations for Elms on maps, Richens has shown where the distribution seems natural.

It is a moot point how far back we go with our searches. Printed records begin little over four hundred years ago, a trifling time compared with the vast period there have been plants in our country. Have pre-Glacial records a place, except as a curiosity, in local Floras? There will not be all that number relevant to to-day's local flora, but this background information should be known. Palaeo-botany and fossils can shed light on still-existing plants. A good example of this is the records of seeds of Water Soldiers from the Eocene and later, since one of the species from the Pleistocene is not distinguishable from the one we have to-day. Here is an apparently native plant which is now a shy fruiter, so might have been thought a recent introduction.

Then we must have a reference to the remarkable results of pollen analysis and allied techniques. These have told us, for example, that many of our common weeds or trees, even which were supposed to be comparatively recent introductions, have in fact been with us far longer than was assumed until recently.

Then there is the changing climate of our Islands, at least over the last two or three millenia, and particularly exceptionally cold or dry or wet or warm years, since it is the extremes of climate which most affect plants.

Certain animals need special country to live in, or crop, or avoid certain plants, or insects need special ones for their eggs and larvae. I expect you know the importance of Jays in disturbing acorns; but after a recent broadcast an ornithologist sent me a useful observation of them taking and spreading the bulbils of Martagon lilies.

Ecology, plant ecology at any rate, is now the basis of some modern Floras, but it needs applying to past ages as well. On Sark, I suspect the natural climax on the tableland is a rough, bare heathland—as the top of the neighbouring Brechou is to this day. Documentary evidence from Tudor days, and much earlier, agrees with this, but I would like an expert ecologist's opinion as well, since this supports my belief that few, if any, trees are native in the Channel Islands, except perhaps in the valleys.

An expert botanist may be able to detect introgression or full hybrid origin in a plant, and so deduce the past presence of a now vanished or rare species, a fact calling for comment. In the Channel Islands, *Centaurea jacea* in particular, is variously mixed with *C. nigra* and *C. nemoralis*.

Despite the lack of unanimity between the experts on some of the derivations, another source for records is place-names. Recently the Dame of Sark put me on to an old source which showed Galingale as growing only in one field in the island, and that it had given its name to that field. The patois name for Galingale is Han, and this field for centuries has been known as La Hanière, and that is the only place we know Galingale in Sark

to-day. I shall suspect Galingale now or in the past if I come across other Hanières in the Channel Islands, since the patois name is the same in Jersey and Guernsey.

Documents are a tantalising source, but may provide useful clues such as where long-vanished buildings or villages used to be, or merely with such simple phrases as an alder-grove. Some Saxon charters refer to prominent boundary hedges and trees—Mr. Grose has made use of these in his *Flora of Wiltshire*. Recently, I came across what I suppose is a first record for any Mal-low in Kent. It occurred in a document dated November 1546, connected with the Monastery attached to Canterbury Cathedral, where the Prebendary was granted “a way through the Gimews to bring in wood”—and details allow this to be pretty closely located. This word is connected with the French Guimauves, and is likely to refer to Marsh Mallows which are larger and more permanent, and which grow to the present day very close by. Another religious, in effect documentary, source, but a rather unsatisfactory one, is the foliage carved on pew-ends and on the capitals of pillars—Dr. Druce wrote up the numerous examples in Southwell Minster. Do not forget paintings and illuminations and some of the lovingly, exquisitely depicted plants in them, for it may be known where a given picture was painted. The Teasles in Constable’s ‘Flatford Mill’ are still there to this day, 150 years after; and Samuel Palmer is an example of an artist who might well help in Kent. Dr. Druce in the *Flora of Northamptonshire*, showed how many first records are to be found in the poems of John Clare, who made many first records of birds too, but in my experience most poets are wildly out in their reference to flowers. Do not use only old documents for old records—I learnt about the history of the cultivation of Rape from the report of the Annual Congress of Seed Crushers, held last year in Stockholm. And such publications as *Country Life*, *The Field*, *The Countryman*, *The Gardener’s Chronicle* and many others can also usefully put one on the alert.

Geography should be brought in. Those remarkable borings made in the Broads during the last decade showed their artificial origin, and at the same time named quite a number of plants which came up in the borings from lower levels. Another way in which geography helps is in such matters as being aware of natural processes or the changing coastline, or the altered courses of rivers. I hope one day geographers will be able to explain to me how sand plants could grow on Sark a hundred years ago, since to-day there are no suitable localities and no sand except at low tides, unless this bunch of records has some other explanation. Of course geography is taken into account in many Floras—for example, in accounting for the vanished saline plants in Guernsey from the days when the north part was, in effect, a separate island; or knowing where old mills were. Economic geography also can be important, say in recognising hammer ponds in the Weald, or what were the trade routes and methods of transport,

a source for aliens from time immemorial.

To write a flora properly demands an acquaintance with history and general knowledge to be aware who did roughly what at what time, as well as some of the details. Charlemagne is said to have encouraged the planting of House Leeks as a protection from lightning, and he ordered Fennel to be grown on all the imperial farms. Edward I reckoned to eat eight and a half pounds of Fennel a month, and no doubt many others followed the examples—or edicts—of these eminent people. The Romans, too, are said to have been particularly fond of Fennel (and the Saxons of Leeks). I read of an effigy of Henry III and in the hay with which it was stuffed were found specimens of Pennycress. Perhaps it is known who did this stuffing, and where.

Maybe the question of badges comes in, such as the white and red roses of York and Lancaster, or the broom of the Plantagenets. This year, I was at the Lonach Gathering at Strathdon, the oldest one in Scotland, where two of the clans traditionally march to the Games ground, one of them wearing in their bonnets, broom, and the other white heather. I wonder to what extent these badge plants were, or are, specially fostered?

Perhaps this leads on to some of the magic and superstition connected with plants and especially trees, sacred trees being often solitary and venerated and recorded, and these beliefs go back a very long time. David Allen knows very much more about this subject than I. I hope the language of flowers is dead, but the Mayor of Sandwich still carries a blackthorn staff in processions; and there are special plants connected with churchyards and graveyards.

Then there is the whole field of herbal history, herbs as medicines in the days when there were no chemists and people largely provided their own remedies, and herbs for kitchen purposes, to add sweetness to the person or food or dwellings of our ancestors. Herbs were much grown in monasteries, and when on the plan of one you see the word herbarium, the plants in it will not be dried. Mints at any rate, were grown in great variety—one reference runs "How many varieties there are. I might as well try to count the sparks from Vulcan's furnace below Etna". I imagine that at the Dissolution, many monastic herbs found their way into other gardens and places. The close contact between foreign and British monasteries certainly was reflected in the plants that they introduced and grew. The connection between the Austin Friars and the paeony has been particularly interestingly told. I shall not go into the fantastic hocus-pocus connected with herbs. Rudyard Kipling wrote: "Everything green that grew out of the mould was an excellent herb to our fathers of old", and perhaps this very fact of the numerous plants they used, many of which were virtually useless, but to which references are made nevertheless, should help us in tracing back the history of plants.

Farming history is of great importance—the field systems, the crops grown, the livestock kept, and how these varied from time to time and place to place. There is not nearly enough contact between the botanist and the farmer, or horticulturalist, which would help interpret so much. I remember recording on a mapping card, Salad Burnet and Timothy as being planted, and a colleague expressing amazement, unaware they were constituents of leys. Then the Enclosures in England from the 15th Century onwards, the clearances in Scotland in the early 19th century, and when sheep began generally to be kept on the uplands had, of course, important effects biologically. There is also the aspect of the very impure seed used until comparatively recent times. As late as the last century, hay-seed was normal for sowing lawns, parks, etc., and often came from different parts of the country. Large quantities of foreign grass and legume seeds are imported, currently at the rate of some 15,000-20,000 tons a year, from all over the world, most of these alien plants looking just like our own natives, and this has been going on year after year for a long time. I imagine that up to at least Saxon times, a pure crop of corn would have been unknown. There is something in the paradox that the weeds of old are the crops to-day, and the crops of old are the weeds to-day. We know, and it was dramatically illustrated by Tollund Man, that such plants as Oraches and Goosefoots were used for normal consumption.

And do not forget the huge subject of horticulture, commercial and private, flower-garden, vegetable garden and park, and what was grown in gardens (and thrown out from them) at different times, even such unattractive ones to us as Amaranths. If you look at the copy in the Linnean Library of the 1759 edition of Miller's *Gardeners Dictionary*, you will find he describes thirteen Amaranths (and they have been annotated by Linnaeus himself with his own Latin names) and virtually all of them are dull and weedy species.

And as in farming, there were different fashions as to what was grown and what was appreciated. The Cornelian Cherry used to be widely grown in orchards, partly for its pickled fruit. This seems evidence of milder summers in the middle ages, because I do not think it often fruits in this country. But it might account for its place in lists of British "wild" plants, although it is very rare to see any tree nowadays looking in the least wild.

But perhaps one of the largest influences on our countryside dates from the 18th century and such immensely popular landscape gardeners as Kent, Brown and Repton, and the search for the picturesque generally. They altered the countryside in a wholesale way, planting trees of all sorts in their clumps or avenues on many thousands of country estates—on one alone, a hundred thousand trees were thus planted, many of whose descendants will have survived or mingled with the existing vegetation. These improvers imitated nature so successfully that we now often take their plantings for the natural scene. We should, perhaps,

investigate more closely and precisely what they planted on those estates where it is known they operated. Our eyes, nowadays, are generally so dulled by varying shades of modern subtopia that we forget how very little in this country really is natural at all. As an example of a specific species, I found that Rivers, that well-known Hertfordshire firm, a hundred years ago freely used "the more vigorous kinds of *Rosa sempervirens* as an undergrowth in their 'wilderness'." Sweet Briar was freely planted too. Hedges became really widespread only in the last 200 years and they have had, like walls, a great influence on the countryside in the artificial habitats thereby produced, as well as no doubt affecting the micro-climate of the fields themselves.

Beginning in the 17th century, there was the craze for evergreens, and in the 19th century, one for pineta and saliceta, and then that remarkable fern craze in Britain. I often wonder how much the spores from these ferns escaped and established themselves in other places where they are now happily growing. Incidentally, I daresay one of the "stations" in which ferns were found may be becoming a thing of the past as steam engines give way to electric diesels—I refer to the fine tufts one sometimes finds on the sides of platforms where these plants used to enjoy the steam from the locomotives.

Nor was it only the 18th century people who planted plants in the wild wholesale—that rascal Robinson knew wildflowers well and collected them, and made strenuous attempts to naturalise the hardier herbaceous plants in hedgerows and woods. But numerous, more or less enlightened land-owners, also thought this a good thing, and that by, for example planting odd cherries in the middle of woods, they were beautifying the landscape—and so often they were.

And while we are talking of enlightened land-owners, we might mention the effects of sport—some plants, excellently established in our woods, were put down for game covert, or sown in pheasant mixtures. Many of our woods are valued, or planted, as fox coverts; and on the moors, their management, and in particular the practice of muirburn, makes a huge difference to what grows there.

A field that might repay investigation is that of railway embankments and cuttings. I was told some time ago that the archives of many railways do still show what was intentionally planted, and it would be a great service if someone disinterred these facts and summarised them. I got a new line on this in a recent letter, after a broadcast, when I was told it was the practice of seed-merchants to sell their tailings to the railways to sow on the banks to stabilise them. The activities of the Roads Beautifying Association should also be looked into in assessing records from roadsides—which, in my experience, may misleadingly be described as "far from houses".

But people have been, and are, planting plants and sowing seeds widely all the time, as some of you may have seen in the

letter in *The Times* early this year, saying how Samuel Butler wished that "people would more generally bring back the seed of nice plants and introduce them broadcast, sowing them by our waysides and in our fields".

I have not yet referred to forestry, which is of course a potent influence in affecting plants in any area, both in what it brings in and what the trees suppress and their other ecological effects. This subject can be carried back a long way, for example by examining charcoal or by reviving Roman wood to ascertain the species. History does not relate how he harvested the subsequent trees. I often wonder as I see False Acacia trees around the country how many of them owe their origin to Cobbett's strenuous advocacy of what he called the Locust. All this, and much more, does show how careful we should be in arguing "it could not have been planted there".

Finally, I would recommend to you the pub as a fallible, but still useful, source of information on old records; and also the recollections of people who do not visit pubs. I know what old people's memories can be like, but nevertheless, on occasions they do help. In Jersey, we recently got the first record for *Oxalis tetraphylla* from someone who used to collect it and give it to her school colleagues as four-leaved clover to bring them luck in exams.

Well, there are a few thoughts. These sources many not unearth many old records for a local Flora, or unfailingly provide information relevant to present-day distribution. But I suggest that these wider aspects, which in greater or lesser degree have already been used, should help get the feel—Gefühl ist Alles, as Goethe said and the framework into which to fit the old records we collect and to judge them. One problem which such a wider approach might clarify is that of some Thornapples. There was a startling recent example near my home in Kent. The new landlord of the Chequers, at Crouch, took over some ground in Mereworth Wood which had not been tilled for a generation, and perhaps never. He sowed potatoes, and in the first year the plot was thick with Thornapples, and they still persist there. This is no new puzzle, but surely local history and experimental botany at least could suggest the explanation of where these Thornapples came from.

Perhaps our Society might sponsor an Economic and Social History of the British Flora. And certainly there must be a great many apt references awaiting the light of day which would illuminate or add to our old records, and give clues also for making fresh finds. Our Floras must be as accurate as full research like this makes possible, and this calls for a great deal of hard and unpaid work. But they do also need the spark of life and the stamp of their author's personality—and I suggest that the more sources he uses, the more likely he is to achieve this.

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Discussion

Miss CONOLLY, commenting on the contribution of pollen-analysis and other disciplines of Quaternary research, mentioned first the recent work by Miss Turner (of Cambridge) which shows how even a picture of mediaeval farming systems may be revealed by detailed pollen analysis. Secondly, she pointed out the need to distinguish between "records" based on pollen and on macroscopic remains. For pollen could be either of 'local' or of 'non-local' origin, the latter moreover including a certain proportion from 'long-distances'. As the distinction (of this last), even when possible, calls for special techniques it is not safe therefore without confirmation to take a record based on pollen as a species record for the immediate locality of the pollen sample. Moreover, determinations from pollen are rarely possible at the species level. Macroscopic finds on the other hand are of local origin, and more often permit of specific determination. By and large the contribution here is more in the realm of the *History of the British Flora* (Godwin, 1956) than to vice-county or county-flora records.

As a warning, an example was given of the type of mis-identification possible with old historic records: in an English translation of Apicius' *Art of Cooking*, a diet of the poisonous 'Black Bryony' is prescribed. This is because Pliny's term *tamnus* is mistakenly assumed to refer to the same plant as the Linnean *Tamus*.

The two names have been regarded as orthographic variants (Gilbert Carter), but even so the plants cannot be assumed to be identical.

Mention too was made of the former extensive use of Holly, especially in Derbyshire, as winter feed for sheep, and the suggestion by Radley that few of the present pure stands of Holly near these villages may be natural.

Mrs. LE SUEUR said she was very puzzled by the present day appearance of Alderney and Sark as they present completely different pictures. Alderney appears to be bleak, while Sark is lush, green and full of tall trees. She had recently read an article which mentioned that until the 1830's Alderney had been cultivated on the open field system and there was one village containing all the inhabitants. From September to March the cattle and sheep were allowed to graze all over the island. In March fences were erected and parts of the island cultivated; the fences would then be removed in September.

In 1565 Sark was given to Helier de Carteret by Elizabeth I. He took with him farmers to settle the island. Each farmer was expected to build his own house and cultivate the ground around that house. Hedges were built round the fields, To-day Sark is covered by small fields with huge hedges round them, whereas Alderney is quite open and bleak owing to the different methods of cultivation.

Mr. ALLEN did not think botanists went through entomological literature often enough. Plants were usually food for insects and he quoted an example in the Isle of Man concerning the Butterbur Moth the records of which suggested that the plant was not a recent arrival in the island.

Mr. T. A. W. DAVIS pointed out that a Butterbur Moth had been attracted to light at his house which was more than a mile from the nearest site where *Petasites hybridus* occurs, and where it is known to have been introduced early in the present century. There was no *Petasites fragans* nearer.

Mr. McCLINTOCK stated that it should also be borne in mind that insects would eat in captivity what they would not eat in the wild.

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A NEW COMITAL FLORA?

DOUGLAS H. KENT

INTRODUCTION

The system of recording British plants by vice-counties was created by H. C. Watson in 1852, and brought into full use in his *Topographical Botany*, published in 1873-1874.

In this monumental work, 1,428 phanerogams and vascular cryptogams were listed in Bentham and Hooker order, and under each species were given the vice-counties in which the plant had been found, together with the authorities for the various records. The authorities accepted by Watson were herbarium material, local catalogues marked by his correspondents, personal observation, MS notes sent by correspondents and published literature. Critical comments on the intrinsic value of these authorities are provided by Lousley (1951b).

Watson was fortunate in having a large circle of correspondents to assist him in his compilation, but the gigantic task of creating order out of a vast assortment of marked catalogues, stray MS. notes and herbarium specimens should never be underestimated.

A second, enlarged edition of *Topographical Botany* was published in 1883, under the editorship of J. G. Baker and W. W. Newbould. A Supplement appeared in 1905, and a Second Supplement was published in 1929-30.

George Claridge Druce's *Comital Flora of the British Isles* was published posthumously in March 1932, and listed 1,767 phanerogams, vascular cryptogams and charophytes. The work also embraced Ireland and the Channel Islands—areas excluded by Watson.

The Comital Flora, though compiled on somewhat similar lines to *Topographical Botany*, omitted authorities for records, except in the case of certain rare species seen by Druce—here the appropriate vice-county number was followed by an exclamation mark. The omission of authorities for the various records undoubtedly saved considerable expense both in paper and in print, but it makes the checking of a doubtful record extremely difficult, and often impossible. It would have been most useful if the manuscript of *Comital Flora* had been marked with the necessary authorities and preserved for posterity. Unfortunately, the manuscript of the work consisted of a ledger containing a cut copy of *Topographical Botany* with additional vice-counties annotated by Druce. It is regrettable, also, that the present whereabouts of this volume is not certainly known.

Watson confined the main part of his book to the scientific names of plants, the vice-counties in which they were found, and the authorities on which the records were made. Druce, on the other hand, gave considerable additional data, including synonymy, common names of plants, types of distribution, status, details of habitats, frequency, British distribution, an outline of extra-world distribution, and dates and details of supposed first British records. To accurately provide so much information in a book of just over 400 pages was quite impossible and, consequently, much of the data was unreliable, and some considerably outdated, even at the time of publication.

The Comital Flora was received with acclamation by the ardent followers of Dr. Druce, but some reviewers were less kind. Pugsley, in the *Journal of Botany*, criticised the absence of authorities for the records, and questioned "whether a simple continuation of Watson's original work, accurately brought up to date, would not have been preferable". Praeger, in the *Irish Naturalists' Journal*, was incensed at the erratic treatment of Irish species, and claimed that 150 or 160, or 12% of the total species given for Ireland needed emendation. This criticism was wholly justified, but the position has, fortunately, been largely remedied by a list of additions and corrections given by Webb (1952).

Other criticisms were levelled at the inconsistency in the treatment of microspecies, and the erratic and often invalid nomenclature used throughout the book.

One must bear in mind, however, Druce's autocratic views on nomenclature, and his advanced age when he undertook, virtually alone, the compilation of what was to be his last work.

The fact remains, that despite its shortcomings, *The Comital Flora* was basically a most useful work on the phytogeography of these islands, and although long out of print, it is still eagerly sought by students of the British flora.

A NEW COMITAL FLORA?

We come now to a vital question—in view of the forthcoming publication of the 'Atlas' in the new year, do we really need a new *Comital Flora*? I think that we do—providing that the work is presented in the form of a simple check-list, omitting all the supplementary data introduced by Druce in the original edition. This would ensure that production costs would be kept to a minimum.

It will scarcely be possible to botanize with the 'Atlas' in one's pocket, but it should be so with a new *Comital Flora*—and who has not experienced the thrill of turning the pages of the original volume to see if an interesting find is also a new vice-county record? It must be emphasized that the suggested new edition is not intended in any way to compete with the 'Atlas', indeed, much of the information provided in it would emanate from the

Distribution Maps Scheme files. The 'Atlas' may be regarded as an invaluable work of reference, while a new *Comital Flora* may be perhaps considered as a useful item of field equipment.

Since the publication of Druce's work in 1932, many thousands of additional records have been added to the official annotated copy of the book belonging to the Society, and at least twelve papers dealing with emendations and additions to individual vice-counties have been printed in the Society's periodicals. On these grounds alone, there is good reason for considering the printing of a new edition, and it has for some years been the wish of the Society to implement such publication—in fact, the proposal was first made at a meeting as long ago as November 1938 and, but for the War and its aftermath, we might now be discussing a third edition. Recently, the Publications Committee reconsidered the matter and appointed a Sub-Committee consisting of J. E. Lousley, F. H. Perring, P. J. Wanstall and myself, to explore and investigate the means and methods whereby the compilation of a new *Comital Flora* might be undertaken.

1. THE MATERIALS AVAILABLE

Materials available for the preparation of a new work include the vast resources of the Distribution Maps Scheme, the Society's annotated copy of the original work, and personal annotated copies of the book belonging to J. E. Lousley and myself. In addition, reference can be made to *Topographical Botany* and its Supplements, and to cover Wales we have Hyde and Wade's *Welsh Flowering Plants*, and for Ireland, Praeger's *Irish Topographical Botany* and its Supplements.

These, with a certain amount of other literary research, particularly on Scottish periodicals, and examination of herbarium material should form an ample basis.

2. VICE-COUNTIES, OR GRID-SQUARES

Many problems have to be solved before a start can be made, not the least of these are the units or areas in which the plants are to be recorded.

For nearly a century, the vice-county system has held sway, but with the advent of the Distribution Maps Scheme, and doubtless before this, many botanists have felt that the Watsonian method was outdated and needed revising on modern lines.

The following schemes have been suggested:—

- A. The retention of the Watsonian system.
- B. A revision of the Watsonian system with vice-county boundaries redrawn in accordance with existing county boundaries.

- C. A revision of the Watsonian system with vice-county boundaries redrawn along 10 kilometre square lines of the National Grid. The county which already claims the largest portion of the square taking the whole.
- D. Abolition of the Watsonian system and the division of the British Isles into groups of 25 10-kilometre squares—this would provide about 140 divisions of equal area.

I should like, now, to discuss the advantages and disadvantages of the various systems as I see them, and if I persistently use vice-county 21, Middlesex, as an example, I must crave your indulgence, for it is the vice-county with which I am most familiar.

- A. As several speakers mentioned, the Watsonian system has been in practical use for many years and has worked remarkably well, it has been adopted also as a means of scientific recording by bryologists, conchologists, entomologists and zoologists. The chief difficulties in the system consist of unprecise dividing lines between vice-counties and changes in county boundaries. J. E. Dandy, Keeper of Botany, British Museum (Natural History), London, has already told you of the series of large scale maps of the British Isles he has prepared, showing the vice-county boundaries and the changes which have taken place in the boundaries of the counties since Watson's time. These maps are housed in the Department of Botany, British Museum (Natural History) and are available for inspection upon application to the Keeper. Indeed, an excellent start on defining in detail the boundaries of the Scottish vice-counties has been made by Ribbons (1961) on data provided by J. E. Dandy. It must again be emphasised that the boundaries laid down by Watson in 1852 are permanent, and by strict adherence to his system cannot be changed.

A further weakness in the system is the great difference in size of the vice-counties—from small ones like Middlesex with 448,692 acres, to large ones, such as Salop, with 861,809 acres, which makes statistical analysis virtually impossible.

An added complication was Watson's acceptance of a single record as a voucher for each vice-county. This failed to reveal the general distribution of species in the vice-counties; thus, to quote an example, by following the methods adopted by some producers of distribution maps, both v.c. 21, Middlesex, and v.c. 24, Buckingham, would be totally blacked-in or shaded for *Gentianella germanica*, yet in the first vice-county it is known only from a single locality within 100 yards

of the boundary with Hertfordshire, while in Buckinghamshire it is locally abundant in numerous localities in the Chilterns. Lousley (1951b) has pointed out that the position is even worse in the case of plants dependent on special habitats, e.g., maritime and riverside species.

Fortunately, this complication will be largely eradicated by the publication of the 'Atlas'.

- B. A revision of the Watsonian system with vice-county boundaries redrawn in accordance with existing county boundaries.

Undoubtedly the most important development since Watson laid down his vice-county boundaries was the creation of the County of London in 1889. This involved the merging of parts of W. Kent, Surrey, S. Essex and Middlesex to form a new administrative county. Other important changes in county boundaries have taken place near large cities like Birmingham, Bristol and Manchester. Numerous minor changes in boundaries have also taken place in many parts of Britain, and more, including some very important ones, have been recommended by the Boundaries Commission—even to the extent of merging some small counties into their larger neighbours.

It seems that changes in county boundaries will continue to take place indefinitely, and in view of this I can see little advantage in adopting the present-day delimitations.

- C. A revision of the Watsonian system with vice-county boundaries redrawn along 10 kilometre square lines, the county which already claims the largest portion taking the whole, appears at first glance to be practical. Brief study reveals that the scheme bristles with difficulties.

The western boundary of Middlesex, v.c. 21, is based on the river Colne and its tributaries and is not difficult to trace on a 1" map—the suggested revision would push this boundary westward to form an imaginary line enclosing parts of Berkshire, v.c. 22, Buckingham, v.c. 24, and Hertfordshire, v.c. 20. A revision of the present northern boundary of Middlesex, largely based on ancient earthworks—and admittedly difficult to follow—would result in the transfer to Hertfordshire of the only area of Middlesex chalk of any importance, and the loss to the latter county of *Cardamine bulbifera*, *Blackstonia perfoliata*, *Calamintha ascendens*, *Origanum vulgare*, *Inula conyza*, *Ophrys apifera* and *Anacamptis pyramidalis*. John Blackstone would turn in his grave!

The eastern boundary of Middlesex based on the old course of the river Lea would be pushed eastward to form an imaginary line running from Waltham Abbey to Wanstead and West Ham, thus enclosing part of South Essex, while the southern boundary, which mainly follows the course of the Thames, would be extended northwards in its eastern sector and southwards in its western sector. Among the changes resulting from this revision would be the transfer of the City of London to Surrey, and the Royal Botanic Gardens, Kew and part of Richmond Park to Middlesex.

This haphazard state of affairs would doubtless be duplicated in many other vice-counties, and I do not think that this scheme can be seriously considered.

- D. Division of the British Isles into groups of 25 10-kilometre squares.

The main advantage of this method is that the British Isles would be divided into about 140 squares of more or less identical size. The chief difficulty, however, is in ascertaining the purely artificial delimitations of a grid-system. The vice-counties have, in most cases, rivers, hill ranges, valleys and roads as their boundaries—grid-lines are less easily traced, and often can be precisely located only with the aid of a map of a fairly large scale. This is particularly so in areas of heath and moorland where salient features needed to pin-point a boundary are absent.

To sum up, I feel that only the first and the last of the four schemes are acceptable for further consideration, and on both historical and practical grounds, I am strongly in favour of retaining the Watsonian system.

3. THE PLANTS TO BE INCLUDED

The next step is to decide which taxa are to be included in a new *Comital Flora*.

Watson was extremely careful in the selection of plants for inclusion in *Topographical Botany*—though even he omitted *Cardaria draba* and *Senecio squalidus* as mere casuals—despite the fact that when his work was published, the former species was known to be established in at least ten vice-counties, and the latter in five.

Druce was less selective in his choice of plants for *Comital Flora*, and the inclusion of such species as *Vicia tenuifolia*, *Potentilla norvegica*, *Jasione perennis* and *Echinochloa crus-galli* appears to be of little scientific value. Both Watson and Druce received adverse criticism on their selection of microspecies, but no doubt the compilers of any future work will also offend in this respect.

Dandy (1958), lists 2,137 orthodox species, of which 1,511 are native and 626 of alien origin; in addition, he gives 73 subspecies and 685 microspecies, making a total of 2,895. If hybrids are to be taken into consideration, we must add a further 538, making a grand total of 3,433 taxa. This is almost double the total number of plants included by Druce in the *Comital Flora*, and it is obviously impracticable to include so many taxa in a new edition.

The Distribution Maps Scheme, on the other hand, are including in the 'Atlas' approximately 1,695 orthodox species, of which 1,449 are native and 246 of alien origin, about 50 subspecies, 360 microspecies and 32 hybrids, making a total of 2,107 taxa.

It would appear, therefore, that careful balance must be made between the taxa listed by Dandy and those mapped for the 'Atlas'. At a suitable time this problem will probably be referred to a select Sub-Committee, in the meantime a few general suggestions and comments may not be out of place.

NATIVE SPECIES. All orthodox native species, including those which are extinct, should be included.

ALIEN SPECIES. Alien species known to be established in, say upwards of ten localities, should be included. In addition, certain casual species showing a marked increase in occurrence in recent years should be treated so that their future spread and possible establishment may be followed. It is well to remember that such well-known plants as *Montia perfoliata*, *Galinsoga parviflora*, *Crepis vesicaria* subsp. *taraxacifolia* and *Veronica filiformis* were at one time regarded as mere casuals of local occurrence. Recent spreads of this type which come to mind and which need careful recording are *Bromus laciniatus* in the London Area and elsewhere, and *Amsinckia menziesii* as a weed of cultivated ground in East Anglia.

Alternatively, there seems to be little purpose in listing such common sporadics as *Lepidium sativum*, *Centaurea diluta*, *Phalaris canariensis* and *Setaria italica* which are found on most municipal rubbish-tips, but rarely in other habitats.

Planted trees which are not known to regenerate in Britain are also best excluded.

SUBSPECIES. Those subspecies which show marked patterns of geographical distribution differing from the typical subspecies, e.g. *Stellaria nemorum* subsp. *glochidisperma*, *Ranunculus flammula* subsp. *scoticus*, *Veronica spicata* subsp. *hybrida* and *Gentianella amarella* subsp. *septentrionalis*, should I think, be treated.

Certain other subspecies which fail to show patterns of geographical distribution different from the typical subspecies, and which are often found growing with, or near them, e.g. *Galium*

palustre subsp. *elongatum* and *Sparganium erectum* subsp. *neglectum*, are perhaps best omitted.

MICROSPECIES. There has been a considerable advance in the study of critical groups in the last twenty years, and revisions of *Rubus*, *Alchemilla*, *Thymus* and *Hieracium* have been published. It should not be difficult to provide data for inclusion, though necessarily incomplete, if so desired.

HYBRIDS. It is probably desirable to treat such well-known hybrids as *Geum* \times *intermedium*, *Stachys* \times *ambigua*, and others, particularly in the genus *Salix*. Hybrids rarely reported, or known only from a few localities are perhaps best excluded.

4. THE STATUS OF THE PLANTS

Many British plants which are native in certain vice-counties occur outside their native range as established adventives in other vice-counties, thus *Lepidium latifolium*, a native of salt-marshes round our coasts, grows abundantly as an alien in parts of the Colne valley in Middlesex and Hertfordshire, while *Verbascum virgatum*, a native of south-west England, grows as an established alien at Hounslow, Middlesex. Likewise, *Clematis vitalba*, native in Middlesex, is found as a naturalised adventive in a number of Scottish vice-counties.

Watson indicated vice-counties in which a species occurred as an introduction by placing them within round brackets at the end of the native list. Druce adopted square brackets, and in his introduction to *Comital Flora* wrote "The vice-counties in which the plant is supposed to be native are unbracketted, but when there is doubt of the nativity or of its identification, the records are enclosed in brackets". This is misleading, for we have here, not only records of adventive occurrences but also of errors. To complicate matters even more, native species which have become extinct in certain vice-counties, also find their way into brackets, e.g., under *Pulsatilla vulgaris* we read "Extinct 23, 28, 37"—the whole entry being enclosed within brackets. The same method is used for *Corrigiola litoralis*, and doubtless for other plants. This again is inconsistent and misleading, for one could assume that the species were in fact formerly adventive in the vice-counties in which they had now become extinct.

A series of brackets can appear unsightly in print, and I would suggest could be suitably replaced by the prefixing of the well-known dagger sign to the appropriate vice-county numbers in which a particular species occurs, or has occurred, as an established alien.

5. AUTHORITIES FOR RECORDS

As mentioned previously, Watson set very high standards with regard to the authorities for his records. Druce was less fastidious.

The following are suggestions as to authorities which may be considered acceptable in a new edition of *Comital Flora*.

- A. Herbarium specimens.
- B. Printed records from reliable sources.
- C. Record cards from the Distribution Maps Scheme files.
- D. Personal observation from reliable sources.

6. DATING THE RECORDS

One of the chief difficulties encountered in using *Comital Flora* is that very few of the records are dated. Indeed, Druce, in the Introduction to the work, states that "even of those species duly recorded, many rest on very old authority". A perusal of the pages of the book readily bear out Druce's words. *Cochlearia anglica*, *Samolus valerandi*, *Scirpus cespitosus*, *Blysmus compressus* and *Juniperus communis* are all shown as occurring in Middlesex, yet the first and second were last recorded in 1869, the third in 1737, the fourth in 1800 and the fifth in 1763, and all have undoubtedly been long extinct in the county.

Information of this type is of little use to the student of plant geography, attempting to map the present vice-comital distribution of a plant—though again this defect will be partially remedied by the appearance of the 'Atlas'.

It is, however, important that in a new edition of *Comital Flora*, some effort should be made to place the records in categories according to the dates in which they were made: thus, a vice-county number printed in italic type would indicate that a record was made before 1900; ordinary Roman type would reveal that a record was made between 1900 and 1940; heavy type would show that a record was made after 1940. Where a species is known to be extinct in a particular vice-county, the v.c. number could be followed by a capital E.

Though by no means perfect, this method would at least be an improvement on the existing system.

7. ERRORS AND DOUBTFUL RECORDS

The problem of doubtful and erroneous records is perplexing. It may be well to exclude them entirely, but my impression is like that expressed by D. McClintock, that if this were done, they would, from time to time, be exhumed and reprinted.

I have given the matter a good deal of thought, but regret that I am unable to offer any really practical method of dealing with this difficult group, other than to suggest placing them in an appendix at the end of the work.

8. THE PROCEDURE TO BE ADOPTED

The procedure to be adopted in a new compilation would, of course, be a matter for the Publications Committee, but I should like to offer a few suggestions.

Possibly the first step would be to set up a special Regional Committee to deal with queries—and they will be numerous.

A series of record sheets, hereafter referred to as “master-sheets”, ruled into seven columns, could be prepared, the columns being headed in the following order:—vice-county or grid-square number, pre-1900, Authority, 1900-1940, Authority, post-1940, Authority. The first column could then be completed longitudinally with vice-county numbers from 0 to 112 and H1 to H40, or alternative grid-square numbers. One or more of these “master-sheets” would be used for each plant included, the name of the taxon concerned being placed at the head of the sheet or sheets.

The first annotations should, I feel, be made from the data accumulated by the Distribution Maps Scheme, additions from other sources being added later. It would be most useful, also, if records based on material housed in the larger National Herbaria could be added. This would necessitate the assistance of a number of able volunteers, but would greatly enhance the value of the records.

The work of annotating the “master-sheets” could be carried out in Families, or where they are unduly large, as in *Leguminosae* and *Compositae*, in sets of Genera. As each was completed, drafts could be prepared with an Appendix of queries and doubtful records. These could be circulated to the Regional Committee, the members of which could attempt to settle the queries for their respective areas.

With the queries finally settled, the work of preparing the typescript could be undertaken. The project would probably take upwards of three years to complete, but the result would be most rewarding.

Finally, I would suggest that the completed “master-sheets” should be offered for safe-keeping to the British Museum (Natural History), London, where they could be made available for inspection. Thus, no longer would we be plagued with interesting, but obscure records, the validity of which it is impossible to ascertain.

ACKNOWLEDGMENTS

I am greatly indebted to J. G. Dony, J. E. Lousley, F. H. Perring and P. J. Wanstall for many of the suggestions incorporated in this paper, as well as much interesting discussion on the subject.

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Discussion

Mr. A. W. WESTRUP opened the discussion by asking which plants are to be regarded as truly native and which as introduced. He pointed out that some known introductions, e.g. Sycamore, occurred before most of our ancestors themselves had arrived and so were as good natives as ourselves. Others, whose remains were known in interglacial deposits, had probably died out in most of their locations and their presence to-day was the result of recent introductions. Most of our plants, especially the weed species, were continually being exposed to new genetical material from plants derived from introduced seed and so 'native' strains of many could no longer be said to exist. He suggested that reliable records really date back no further than Tudor and Stuart times.

He said he was undertaking the inclusion of doubtful records for the Flora of Hampshire. The difficulty was that what one person accepted another rejected wholeheartedly. He suggested that doubtful records should not be put into an appendix at the end of a Flora but in brackets.

Mr. KENT reminded Mr. Westrup that he did suggest that he would include in a new Comital Flora all orthodox native plants and aliens established in ten localities and upwards. He did not like brackets as there was a tendency to throw everything doubtful into them.

Mr. WESTRUP explained that he was not suggesting that established aliens be omitted, but he thought that the status of these plants should be made clear in the Comital Flora.

Dr. PERRING said they had been collecting doubtful records as a part of the work for the Maps Scheme and in certain cases old errors had turned out to be perfectly good records. For example there were many doubtful records in the south of England for *Parnassia* and they got a strong impression that it was in these counties after putting all the errors together. When using a Flora one found tucked away in the back the 'errata', but one used the Flora without referring to the errata. He said it would be useful if someone could go through all the literature and put the 'errata' onto cards.

Mr. DAVID pointed out that square brackets are an accepted form for 'omit' so should not errors go into square brackets and doubtful records into brackets?

Dr. DONY thought Mr. Kent's paper had been one of the most important. He asked to return to the question of the limits of the county and wondered what would be done if the county boundaries were taken as they are laid down now, and then considered again in a few years time when they would not be shown on the new maps. He pointed out that there had been many changes in the past—he had had to consider ten of these in Bedfordshire and every one was made in 1890. If the country is taken as a whole it will be found that there have been no changes since 1890. He thought that it may be possible to hope that after the Boundaries Commission had done their worst, counties might remain constant for seventy years or so.

Professor HAWKES said that each time a county boundary was revised it was supposed to be for the last time. He suggested that we should keep the boundaries we had rather than go on to something else.

He wished to return to the question as to whether a Comital Flora is necessary at all. A new Comital Flora might be of value in county Flora revisions, but there seemed to be no doubt that we shall come to rely more and more on the 10 km. Maps Scheme survey and shall find that the division of our data on a county basis assumed much less significance once the Distribution Atlas had been published. Most county Floras are also being prepared with the records arranged according to the National Grid and recorders can also obtain data from the Maps Scheme for their counties as Dr. Perring had already informed us.

We should therefore discuss this problem in the light of what would be most advantageous for the future, and what other projects or recording schemes might lead on from, or link to, the Distribution Maps Scheme, to see whether the time and effort spent on a new Comital Flora would really be justified.

CUTTING THE COSTS

R. W. DAVID

As a preface to what I have to say on "cutting the costs", I must make two points. The first is that I am speaking, not as any kind of botanist, nor as the potential contributor to a local Flora, but as a publisher. If I succeed in suggesting any possible economies, they may still not be acceptable to you, on the grounds that they would too far diminish either the clearness of presentation or the scientific accuracy of the Flora for which you are responsible. Any such considerations I have left aside; for my job, I take it, is merely to point out those areas in which economies can in fact be made, and those others in which economies are not a practical possibility or would be so small in effect that it is a waste of effort to seek them.

My second introductory point is that I am well aware—and even more so after listening to the previous discussions—that what I have to say will be extremely obvious and elementary to many of you. My advice is of the tritest, my examples of good and bad practice perhaps too starkly black and white. I don't regret this. It has been my experience as a publisher that it is impossible to state the basic principles too simply or too often, and that even the most conscientious and knowledgeable author is frequently unaware how fatally easy it is to run up an enormous printer's bill, quite unnecessarily and without knowing what one is doing. In stating the principles again I propose to be extremely short, so as to leave time to develop in discussion any particular leads that you may think worth pursuing.

"Publication" comprises three operations: editorial, that is the preparation of the manuscript or typescript that is to serve as what the printer calls his "copy"; production—the processes of printing and binding; and distribution, namely the getting of the finished books out of the warehouse and into the hands of potential readers. In each of these operations economies are possible.

First, editorial. The chief enemy of economy is perfection. An author or compiler, if he is not positively to inflate his costs, must be content to draw the line at some stage, refusing to admit any additional material that may come in thereafter, and presenting to the printer a final, complete and tidy manuscript. All three qualities are vital in printers' copy, for a twofold reason. A book is an extremely complicated article made up of hundreds of intricately interlocking elements. Interference with any one of these may throw out all the others. I will illustrate both these

factors. Luckily for the publishers of CTW, *Diapensia* was discovered in Britain after printing of the *Flora* was largely completed. A few months earlier and it would have been difficult to resist pressure from the authors for its insertion. This would have meant cutting every page in half from Ericaceae onwards and re-soldering the halves, correcting every page number, re-numbering orders and families, altering hundreds of cross-references, and substituting a whole new general key and a new index. The bill for this would have run to hundreds of pounds. And so with the process, too. Authors sometimes complain that a few days lateness with proofs on their part grows with the printers into weeks and months of delay. They do not appreciate that a specialist reader may have been earmarked to check the proofs, and a particular machine to print the book. If the work is not ready for them at the appointed time, neither can stand idle. They will be put on to other jobs, and it may be some time before they can again be available. So delays will snowball.

The compositor, who brings the type of a book into being by tapping out the letters on a sort of a giant typewriter, is a highly-paid craftsman. His time is money; and much money will be spent if he must pore over an illegible manuscript before he can get on with his job. Provide him with an easily legible and comprehensible typescript. Alterations in proof are disproportionately expensive because all corrections must be done by hand. This means "unlocking" or opening up the cumbersome jigsaw-puzzle of type-metal and with a pair of tweezers inserting the new material letter by letter and space by leaden space. An author once decided on reading his proofs, that his punctuation might, with advantage, be slightly heavier. The bill was "To Commas: £73". Of course, if the alteration makes a line over-run, or still worse a page, the corrections bill can soon become astronomical.

It is as important to fix the form as to fix the content from the outset. If you go to a good printer he can advise you on the types, the headings, the systems of capitalisation and indentation that will secure for you the graded emphases you want. This is a technical problem that must bulk large in any "catalogue work", such as a *Flora*. Unless you are an expert, tell the printer the effect you want and leave him to find the means. To follow your own fancy may be disastrous, for a type face that looks pretty to you may be extravagant or unsuitable for the job you have in hand, or may lack characters or symbols essential to that job. The special cutting of letters not in the normal "fount" of type will prove the very opposite of cutting the cost.

There follows the actual production of the book, and in connection with this I need do no more than explode a few common fallacies. There is, then, only one factor in production that really makes a difference to cost, and that is the number of copies printed. This is because the most expensive item by far is the initial setting of the type, and the more copies this can be spread over, the better. The setting-up of the machines, too, that do

the actual printing, that fold the sheets or that stamp out the covers, is an elaborate process, and the more copies that can be run off from the machine once it has been got going, the cheaper will be the cost of each. The more printing and binding machinery becomes geared to mass production, the more striking will be this effect, and the more prohibitive the cost of doing small jobs. Before the war it used to be reckoned that you could not without subsidy issue a book at an economic price that the public would pay unless you printed a minimum of 1500 copies. To-day that minimum is more like 2500.

In this process of inflation there is one ray of hope. A recent development has been the invention of flexible plastic plates for use with rotary printing machines. These plates have an abnormally smooth and even surface. In printing from ordinary type or stereo plates, the natural inequalities of the metal would produce a blotchy impression or even cut the paper if they were not compensated for by building up the surface of the roller that carries the paper to be printed, so that bump answers depression and re-entrant matches projection. This is done by laboriously pasting little bits of paper onto the roller and testing till an even impression is achieved—a process known as “Make-ready”. A complicated make-ready has been known to take three days, and the cost of this totally unproductive time must be added to the printing bill. Plastic plates may do away with make-ready, so that every minute of machine-room time is spent in actually producing printed copies. No longer forced to carry a quite disproportionate burden of make-ready, the small printing may again become economic.

The only way of cutting the cost of the initial composition (at least until photo-composition becomes a working reality) is to use one of the methods known as “near-print”; that is the reproduction, by photographic means, of an actual typescript. For this, it is essential to have the book specially typed on such a machine as the Varitype, which can offer something of the variety of face (italic, bold and so on) obtainable in printers’ letterpress. The disadvantages of near-print are that it lacks quality and definition, and also flexibility: subtleties of emphasis and distinction cannot be clearly expressed as they can through the very much greater resources of letterpress. It is also impossible with near-print to make more than minimal corrections. As to costs, I have been able to make an exact comparison on a book recently produced by near-print, but also estimated for letterpress. The production (including binding in cloth) of 100 copies of these 164 pages of fairly straightforward copy would cost by near-print £210, by letterpress £400. 750 copies would cost by near-print £450, by letterpress £520. Notice how rapidly, even within this small range, the price per copy comes down as more copies are printed. Remember at the same time that the printing of more copies in order to bring the price down is the classical recipe for publishers’ bankruptcies.

Thus for small printings, up to 800 copies, say, near-print is substantially cheaper. At 800, letterpress, which can make better use of mass-production techniques, begins to draw level. But of course, even with near-print, mass-production can be to some extent brought in for machining and binding, and the cost of near-print, even for large printings, is likely to remain about 15% below that of letterpress. It must also be said that near-print is by far the speedier process, largely because the author is debarred from messing up the proofs. (Remember I speak as a publisher). But near-print is hardly to be recommended for such a complicated piece of printing as a Flora, unless the number to be printed is unusually restricted.

One other recent invention deserves just a mention here, the "cascade" machine. This is in effect a device for converting a card-index into a printed book, by presenting the cards very rapidly, but in order, to a sort of cine-camera which records them as a consecutive list. Printing then proceeds by a normal photo-offset process. My Press is planning to reprint its general catalogue by this method, and it might conceivably be used as a cheap means of reproducing the body of a local Flora, that is the species records. The index cards would have to be typed originally on a Varsity or other electric typewriter.

That binding in paper is in itself a great economy is what Sir Thomas Browne would have called a vulgar error. What makes a Penguin cheap is not the paper cover, but the fact that the books are printed in "runs" of 20,000 copies or more. What costs money in binding is the folding and sewing, and the provision of a hard, rather than a soft cover, will add only coppers and not shillings to the cost. An economy is possible if the folded sheets instead of being stitched are cleanly guillotined and then dipped bodily in plastic glue—the so-called "perfect" binding. But this process is applicable only when quantities of at least 4000 copies are to be bound at the same time, and so is more appropriate to telephone directories than to Floras.

And here may I take up Mr. McClintock's plea for a loose-leaf flora. It could of course be done, but it would, I think, be terribly costly. This is not merely because both the making and the fitting of the cover itself would not be susceptible to any mass-production process, and so would have to be done very expensively by hand. To withstand the wear imposed upon them by the additional play within such a binding, the pages of the book would have to be of much stouter paper which would cost more both in itself and in the slowing down of the printing machines to accommodate its abnormal bulk and lack of pliancy.

Last stage of all, distribution. Here the vital question is: "Is your publisher really necessary?" The answer depends entirely on the kind of purchasers you expect for your publication. If they are a small, compact, easily identifiable group, they can be reached, and serviced, by one man working half-time in a back room, and there is no place for publisher or bookseller. If, how-

ever, the potential buyers are diverse, widely dispersed, and unidentifiable until they actually put in an appearance, they can only be approached through the display and promotion facilities offered by the book trade. To cover the cost of the trade operation, the bookseller will require to retain at least a quarter or, if he is to do the job thoroughly, a third of the published price, and the publisher will need a quarter of the residue. A book sold through the trade must therefore be priced at about double the price of that distributed privately. But there is no half-way house, and the proprietor of a printed work must make his choice as to whether he needs professional help or can do the job on his own. Of course the publisher may be useful in giving technical help on other matters besides distribution; but if your flattery is sufficiently adroit, you can probably get his advice without actually employing him.

[See p. 92 for the discussion of this paper.]

COUNTING THE COST

J. G. DONY.

“Which of you intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it”.—Luke: 14, 28.

It is quite easy to determine the cost of publishing a local Flora as printers will give estimates, and to these must be added a few items such as packing costs and postages and the amount it is proposed to spend on publicity. The figures will show that the costs increase with a greater number of pages in the book and the number and nature of the illustrations that are included. They will also show that the cost per unit decreases greatly if a larger number of the books is printed.

There are three ways in which a local Flora may be published: firstly by a publisher, which is rare, and as all the risks are his we need not consider them now; secondly by a local government authority, usually through its library or museum, by a national society, such as ours, or by a local society or institution; thirdly by an individual. In the categories which concern us most, costs must be watched closely as they will be limited by a grant from the sponsors, or the state of a bank balance.

The costs, whatever they amount to, must be met by sales or a financial loss to someone, and it is most difficult to estimate what the sales will be. There is no such thing as a demand for a local Flora, or for that matter anything else, but only a demand at a price. Some commodities, such as essential foods, are little sensitive to price, but others, such as cars and washing machines are very sensitive. Books, including local floras, are like this. Lower their price and the increased sales will give a greater revenue, but raise their price and the decreased sales will give a lower revenue. There are, of course, limits to these tendencies, but the would-be publisher must watch very closely his costs and seek every means to increase his sales.

At this stage it may be useful to examine the nature of the sales. An analysis of those for the *Flora of Bedfordshire* showed that about half were local. These local sales are mainly to non-botanists, and depend to some extent on the local patriotism there is in the area. The national and international sales are either to libraries, more affected by price than we sometimes imagine, or to collectors of such works, who are mainly botanists wanting local floras for a variety of reasons. Price always enters, for to have the Flora the purchaser denies himself some other pleasure. I estimate that for an average-sized Flora of a typical

county, the local and national sales would each be about 300 but that these would be increased or decreased by 50 or 75 in each case by good or bad publicity and salesmanship. The lower limit of sales of 450-500 would make, for its size, a very expensive book or an unnecessary loss, and the upper limit of 700-750, a moderately-priced book for its size, and expenses cleared or a profit made.

This leads back to the fundamental publishing costs and the need to be watchful of the contents of the flora. An 800-page book will cost about twice as much, other things being equal, as a 400-page one, and the would-be purchaser will need much assurance that it will be twice as useful. It would be a helpful exercise to find out the smallest space into which it would be possible to telescope the bare essentials of a county Flora. I think that it could be done in twenty pages of our *Proceedings*. If this is to be increased ten, twenty or forty fold, it is necessary to consider what the reader will want to know and not the knowledge that the author wishes to display. The greatest shock that I had with the Bedfordshire Flora was the discovery one Saturday morning that it would be 20% larger than our publication grant would allow, and that I had until Tuesday morning to reduce it accordingly. I did it without cutting out any essential information, but a month later we received a Royal Society grant for £300 which, if it had arrived earlier, would have made the cut unnecessary. We used most of the grant to add an account of the fungi and more plates.

In considering the contents one needs to bear in mind most of all the non-botanical local reader. He will be delighted to know that John Jones, who happened to marry his grandmother's cousin, found Grass of Parnassus in Wilton Mead in 1861, and that Dogwood, so abundant around his village, is absent in the south of the county; but he is lost when told that *Parnassia palustris* grew at Grid Ref. TP/789546 between 1850 and 1900, and that *Thelycrania sanguinea*, which he cannot find in any book in his well-stocked library, is common in Districts 1, 2 and 3, but rare in Districts 4 and 5. The local reader must have good English names, he does not mind the scientific ones as well, and above all, needs the names of places and persons. Illustrations present a different problem. I am annoyed when I see drawings and photographs of plants as I am sure that there are better examples to be seen elsewhere. It would worry me less if all the plants dealt with in the Flora were so depicted, but given a limited number of illustrations, I would rather see more and still more maps and photographs of natural scenery. I am, however, willing to admit that I may be in a small minority.

Publicity is the biggest problem of all, and it is essential that it should be well-timed. It is useless to spend money saying that the book will be published soon at some price, wide of the mark, and not have it published in ten years' time. It is best to get the publicity under way about six months before publication and

state 'to be published on a given date at a stated price' and do it. Printers will work to a penalty clause and it is useful to bind them so. The amount to be spent on publicity is also important, and can be decided quite simply. If 500 copies of the book could be produced for £1,000, i.e. £2 per copy, and 800 Copies for £1,200, i.e. 30/- per copy, it would be a benefit to all concerned if £100 were spent on publicity raising the production costs to £1,300 if one felt sure that with this publicity the additional 300 copies would be sold. In this case the price could be as low as 32/6.

Assuming that £100 is allowed for publicity, how best may it be spent? One minute on I.T.V., two minutes on the Odeon circuit, an advertisement in the *Daily Mail*, would all be useless. The money must be spent drawing the attention of the comparatively few people who will be interested to the fact that the *Flora* is ready for sale. This is best done with an attractive brochure boosting the work. For preference this should contain four pages, two being specimen pages from the book, one illustration and full details of the contents of the work. Such a brochure could well cost £30 and with the remaining £70 about seven thousand copies could be posted. Individual circularisation is generally better than having it tucked inside a journal, and societies, local and national, will usually allow the use of their mailing lists. Don't worry if some people get two or three copies as they may need a reminder, and some may even pass a copy on. There must be some Press advertisement, but this is usually less effective than the personal approach.

It is usual, with publications of the kind we are considering, to offer a reduction in price to pre-subscribers. This should be large enough to make it a real attraction, but care must be taken not to offend the book trade. At every stage it is essential to offer the trade better terms than anyone else. Give the maximum trade discount, even if you think it exorbitant, and you will reap a dividend. It may even pay with local booksellers to allow them to have some copies on a 'sale or return' basis. In many cases the names of pre-subscribers are printed in an appendix and this definitely helps sales. There is, however, a moral issue that some hesitant subscribers are almost blackmailed into having their names included.

Publicity does not end with publication, and a book with an attractive dust jacket sells better than one without. It is also useful to send out too many copies for review rather than too few.

The details of publication of the *Flora of Bedfordshire* may be useful to those contemplating a similar venture. It was published by Luton Corporation through its Museum and Art Gallery Committee. A sum of money was stipulated beyond which expenditure was not allowed to go. Publicity, mainly in the form of a brochure, began in March 1953, and the copy went to the printer on 1st June for publication on 1st December. The printer was prepared to take manuscript, and consequently at least £100 was

saved by not having it typed. No error arose from the compositor failing to understand my writing—the only errors were in what I wrote. This method had an additional virtue that the somewhat complicated punctuation was correct from the very beginning. The printer worked under a penalty clause of £10 per day, and the books were delivered a week before the publication day. This had meant working to a very close timetable which was as good for us as it was for the printer. A thousand copies of the book were printed as the Borough Treasurer had to be convinced that, however long we waited, the publication had ultimately to be an economic proposition. On this basis the full costs of publication per copy were 27/4d. We fixed the price at 42/-, but for us there were four selling prices. It was offered to pre-subscribers, with a final date on 1st September, at 30/-; but the trade was allowed a 5/- discount on each pre-subscription order it handled. There was a slight risk that all the issue might in this way go to the trade at 25/- per copy leaving us with a loss of £100, but our final order for the printing was not made until after 1st September and we should then have ordered an additional number of copies. Pre-subscription sales brought in £760 leaving us then about £510 to meet. After publication, we sold to the trade at 28/- (33 $\frac{1}{3}$ % discount) and from the Museum itself at 42/-. So far we have disposed of 773 copies (inclusive of seventy copies issued free for publicity, etc.) out of our original edition of one thousand, and the profit on the venture so far is 1/8d. It would be foolish to claim that our publicity was as good as a firm of publishers would have managed. In some details it was perhaps better than they would have done. At least it worked.

One question remains, namely the possibility of receiving financial assistance. The Royal Society grant is available to any individual or non-profit-making body, and it is interesting to note that this can include local government authorities, and I know of no case when it has been refused for a local Flora. There are two difficulties, as the work must be in an advanced stage of publication and the amount of the grant is uncertain. It is, however, a great assistance to societies having sufficient funds to finance the publication of a Flora but not wishing to tie them up for a long period in such a venture. Above all, it does allow the publication of an otherwise expensive work at a reasonable price. There may be other similar grants but I am not aware of them.

There is, finally, the need within our society for a policy regarding the publication of local Floras. We have, in the past, published a number, mainly for areas where there has been no local machinery which could operate, and this we shall no doubt continue to do. Should this principle continue further? I have attempted to show that local Floras can be an economic proposition given two premises, first that they are of a reasonable length and second that they have sufficient publicity. As a society we are far too polite with our contributors. More often

we should throw papers back to their authors with the demand that they be cut to 25% or 50% of their length, or we cannot consider publication. This we must do if we venture further into the field of local Floras. Our publicity, also, is far from satisfactory even at a national level, and I see little hope of our ever setting up the all-important local machinery. With the Maps Scheme now so successfully completed, work on local Floras could well receive our attention, but before that is done some hard thinking will be necessary.

Discussion

Mr. J. C. GARDINER opened the discussion by saying that there was something ominous about the way these financial subjects had been put last in the programme. Could it be that, with his experience of Government Departments, the Meetings Secretary *still* believed that the Treasury always had the "last say" in any matter? Unfortunately, Dr. Dony and Mr. David, both widely experienced and expert in these matters, had, in their clear and heartless expositions, quite convinced us that finances were all-important. Had their words been heard earlier, he feared that some of the more attractive suggestions of what we would like to have as local Floras, would never have been made.

What struck him most forcibly from the advice tendered by both speakers was that we should, in effect, write our Flora first and do the research work afterwards! What he meant, of course, was that we should know precisely what and how little we are prepared to include in our Flora and then concentrate on collecting the material for that little, avoiding all extraneous data, which neither our own exchequer, nor that of any publisher or sponsor can afford to print and publish. The economy drive must start at the outset, when thoughts of preparing a Flora first germinate. From then on, the whole of the work must be restricted to what is necessary in order to produce the best manuscript limited to the size that finances permit. Only by such methods can the temptation to put more into the publication than we should, be resisted.

Dr. Dony had mentioned the question of advertising. We seemed generally to be a little timid about laying out money on advertising. Surely we have only to consider the relatively large numbers of some publications which appear to be sold as a result of a bold approach to the advertising problem in its widest sense. Who knows? — some good publicity for a county Flora might soon enable him to collect some additional subs. from lots more new members! Perhaps the speakers could have told us a little more about the outlay they would have considered worthwhile in advertising the type of Flora we all had in mind.

Lastly he would like to defend strenuously the value of sponsorship by B.S.B.I. in appropriate cases. Such sponsorship should be a particularly valuable advantage for any local Flora and it should be a kind of hall-mark which every editor would like to see on his publication. If the Society has fallen short of achieving this status, we must make amends—and make amends quickly. This led him to put forward the suggestion that we should not break up without seeking some means to encourage the Society to take an increasing interest in the vast amount of work that

was being done on local Floras at the present time. He wished to propose that a recommendation be made to Council that an *ad hoc* Committee be set up to consider all aspects of how the Society can assist in this work on local Floras and to make recommendations.

Mr CANNON said that like everybody else he had greatly enjoyed the talks given by Mr. David and Dr. Dony. Referring to loose-leaved Floras in use in the Natural History Museum library, such as the *Flora of Hawaii*, he had not found them very satisfactory. One was always afraid that something might have come adrift from the book and therefore he could commend only the traditional method of binding for county Floras.

Miss GIBBONS thought the number of copies of a county Flora sold would depend to a large extent on the size and type of county. For instance, Lincolnshire was large but had a very small population. She suggested that an interleaved copy would be more useful than a loose-leaved one.

Mr. BANGERTER seconded Mr. Gardiner's proposal that the Society should take an interest in local and county Floras. He thought it was not beyond our ingenuity to devise some scheme to put the locality in which the plants grew on record. One of the ways of doing this was not only to be responsible for Floras ourselves, but to give all the help we can and to sponsor them from individuals.

Dr. PERRING strongly supported this motion and added that the essential information on the distribution of plants in a county could, with the use of suitable symbols, be compressed into a very slim volume: for example, the account of the Flowering Plants in Burgess's *Flora of Moray* is only 40 pages long.

Mr. WARREN raised the question of voluntary financial help and mentioned how one member had donated her Premium Bond win towards the production of her county Flora.

Dr. DONY thought this was a matter for a local society if it were sponsoring the work.

Dr. BRADSHAW wished to return to the question of loose-leaved Floras as she had felt the need for one. Could not there be some unbound copies of Floras available so that people could make their own loose-leaved books?

Mr. DAVID said that if blank pages were included in a publication it became liable to purchase tax, Mr. CHANDLER, who was speaking as an Excise man, pointed out that if the number of pages were below 25 it was exempt from purchase tax.

Someone asked what the difference was between the cost of a paper and a hard cover; and what was the difference between the cost of a page of letterpress and a page of maps? Mr. DAVID could not answer the second question but the difference in cost between paper and a hard cover was very slight—say 1/- on a volume the size of a county Flora.

Mr. JERMY wondered whether county Floras could be expanded so that they could be used as text-books? Dr. DONY felt that if this were done it would double the size of the Flora.

Mr. D. ALLEN thought keys should be included for *Rubus* and *Hieracium*. Dr. PERRING stated that in the *Flora of Cambridgeshire* they were having

some keys for those groups which are not available in Clapham, Tutin and Warburg. Mr. CANNON did not think the form of county Floras should be altered by putting in keys as most people will have a standard British Flora. He thought there might be a case for Floras of various small areas centered on holiday regions, i.e., S. Devon. These should be small and with keys.

Dr. N. PRITCHARD reminded the Conference that in the days of the early Floras such as Trimen and Dyer, and White's *Flora of Bristol*, much of the data which was available to the writers was not the same as the data we have to-day and the situation cannot be the same again. A solid body of data had been assembled by the Map Scheme in its place. He referred to Mr. Dandy's point when he mentioned the Cotswolds, Malverns, etc., as areas of considerable interest for which Floras might be written, and pointed out that the areas in between would have to be covered. He thought Floras of such areas would be of wider interest than purely county Floras although one should not just do things for the record. Completeness was not necessary unless the information was going to be used for a definite purpose. In making a Flora, as in any other branch of scientific observation, one's scheme should be to plan the experiment first and collect the data after: in other words, before embarking on a Flora one should ask very clearly what one is going to do with the material and act accordingly.

REVIEW OF THE WORK OF THE CONFERENCE

The President, Mr. J. E. Lousley, in summing-up the work of the Conference, said:—

There are three well defined stages in the production of a local Flora. First consideration of the aims, second the compilation, and finally the printing and publishing. The papers and discussions of this Conference can be grouped under these headings, with a fourth—the summarising of the detailed Floras in a “Comital Flora”.

We started by considering the history and aims of these works. After Mr. Gilmour had skilfully sketched the development of British local Floras over the last 300 years, Mr. Allen discussed the reasons for their compilation. He made out an excellent case for individuality, which has been such an outstanding feature of past productions. Without this very British custom of producing Floras recording distribution within limited areas, a great mass of valuable knowledge would have gone unrecorded. The discussion which followed these papers brought out the need for supplements at regular intervals. Perhaps the stimulus they would give to further records might bring nearer the time when new editions were required.

We then considered how the area should be defined and divided. Mr. Meikle outlined problems of size, politics, natural features and convenience, and warned us against various dangers. In leading the discussion, Mr. Dandy advocated using counties as defined to-day, as the units for publication, provided deviations from Watsonian vice-county boundaries were clearly indicated in the text.

Dr. Perring then spoke on methods for dividing the area. He wisely advocated selecting units of a size which workers could record within a reasonable number of years, and showed how the Grid system has been adapted to meet the needs of the new Cambridgeshire Flora. Prof. Hawkes described the methods employed in collecting data for the Warwickshire work, which is undoubtedly the most ambitious local Flora undertaken to date. Probably most of us felt that the method was brilliant and highly desirable, but the cost in cash and labour far beyond the resources available in most counties.

These two papers made out an excellent case for the use of grid squares as units, but the discussion which followed showed that there are still serious practical difficulties to be overcome before they can be adopted for all recording purposes. Speakers drew attention to their lack of appeal to local patriotism, and the

difficulty of tracing them in the field. We were also reminded of the difficulties of publication since lists of grid squares under each species are very dull reading, while lists of localities convey information at a glance to anyone knowing the county. Neither does it appear that the publication of maps based on grid squares is the complete answer since, if these are sufficiently large to be useful, they take up a lot of space and are expensive. Warwickshire plan a volume of text and another of maps, but few counties could aspire to such ambitions. If this is necessary, we can expect the publication of few new local Floras.

It was also pointed out that the use of grid squares often cuts across easily recognized natural features. Of this, the Isles of Scilly, on which I am working, are a good example. In my Flora I have used the five inhabited islands, and five groups of uninhabited islands as units for recording purposes. The floristics of the inhabited islands with their weeds of cultivation, numerous introduced species, and disturbed habitats are very different from those of the uninhabited, and the five islands have individual characteristics. The uninhabited islands also provide important contrasts which can be interpreted in terms of size, exposure, contamination by sea-birds, etc. Now, the Isles of Scilly are scattered over three 10 km. squares, most of which are sea. There is only one km. square wholly land in the whole archipelago, and some squares of this size include parts of two islands. The sea barriers which are of such importance are sometimes so short that it would be necessary to come down to very small grid units at great labour to obtain the results demonstrated by my use of natural boundaries.

The grid system is already accepted as the basis for a number of county Floras in preparation, but the discussion seems to indicate that we should avoid allowing ourselves to become its slave. Perhaps the answer is to select the best tool for the job, and the right tool for, say, Surrey, may be the Grid, but the right tool for Scilly, the individual islands.

Mr. Townsend gave valuable advice on problems of identification. He emphasised the importance of collecting adequate material, and some of us know from bitter experience how much this advice is needed. Many specimens sent for identification are miserable scraps, often carelessly gathered, and sometimes sent bent round in an envelope without protection. A fantastic amount of time is spent each year in naming, or trying to name, plants which would be recognisable at sight from a decent specimen. Plastic bags are cheap and portable, and a little care and thought can save much of the referee's time and avoid quite unnecessary mistakes. The discussion following this paper brought out the desirability of someone concerned with the Flora accepting responsibility for each critical group, and getting to know the plants in the field. Sending large numbers of specimens to a

referee involves him in unreasonable work and repetition, and seldom produces a true record of the distribution. A far better plan is to get "standard" sheets named by the referee from local material and to make good use of these. The late W. C. R. Watson refused to name *Rubi* unless the senders had made some attempt to work on them first, and perhaps this is the right approach.

Mr. McClintock considered old records and made, amongst others, the excellent points that last records are often as important as first ones, and that records for aliens have been too rigidly excluded in the past. He is on more controversial ground in advocating the use of place names, old charters, church carvings and the like. Determinations from such sources are often little more than guesswork, and the labour involved is considerable.

Before leaving the problems of compiling the Flora, I would like to draw attention to several aspects which, rather to my surprise, have not been mentioned. One is the desirability of publishing some records as they come in. My own experience with records of the London Natural History Society's area has shown how effective short annual accounts of the more important discoveries can be in enlisting support. Mr. Grose in Wiltshire, and Mr. Edees in Staffordshire, are amongst others who have found the same. When people see that use is being made of their records, they are very much more likely to send them in than when they are merely entered in a manuscript which may not appear for years. Annual reports have the advantage that they make sure that the more important records are published promptly and available to other workers even if the Flora fails to appear, and they provide an opportunity for including matter for which there may not be room in the main work, and showing the relationship between plants found together which would be widely separated in a large volume. Preliminary publication helps to get the facts right and complete, and benefits the local societies which find a place for such reports in their journals. Another method is to issue an annotated list with a request for additions in advance of the main work.

I am surprised that no-one has drawn attention to the importance of avoiding vague statements. Instead of "has been found at Reigate" it would take only about the same space to say "Reigate, 1910, in clover field". The latter gives the date, the habitat, and a clue to the way the plant may have been introduced. Published Floras contain far too many statements which leave the reader guessing. Also no-one has pointed out the importance of citing references in appropriate cases. Even the best of Floras is not the final word and it is essential that users should be in a position to trace back important statements to their sources.

A great deal more might have been said about the special problems of Wales, Scotland and Ireland—perhaps here there is almost sufficient material for another Conference.

From compilation we turned to problems of printing and publishing, and Dr. Dony and Mr. David gave valuable and practical advice on the economics of production. A particularly useful warning was on the cost of heavy correction of the type, and to this it might have been added that printers, in correcting one error, often make another even worse. It is essential to spend time on getting the manuscript as perfect as possible before sending it to the printers, and after that to avoid “second thoughts”. Dr. Dony’s example of the very successful publication of his *Flora of Bedfordshire* draws attention to the immense advantage which a local authority exerts in influencing sales of a local work. This is a valuable suggestion to follow up when looking for a publisher. As Mr. Gardiner pointed out in the discussion, finances will have the last say, and the importance of advertising must not be overlooked.

I have left until last, Mr. Kent’s paper on the preparation of a new Comital Flora since this work would be in the nature of a summary of the detailed records in the local Floras we have been considering. He stated the case for preparing a new Comital Flora, and the difficulties in basing it on the Grid System. He gave us an outline scheme as a practical basis, and suggested ways of dealing with doubtful records.

Looking back over all that has been said, it seems that the common thread which runs through almost every paper and discussion is the need for individuality. In my introductory remarks I suggested that every area has its own needs, every worker his own capabilities, and every district its own level of financial support. This has been supported to an extent I little anticipated, and it seems clear that any attempt to encourage rigorous standardisation would discourage the production of these excellent works, and destroy some of their value. Nevertheless, there is scope for the standardisation of some features without loss of individuality and need to review various common problems.

Some of the questions arising from the Conference are as follows:—

- (1) The need for published maps to show vice-county boundaries. This information can at present be obtained only by consulting the maps at the Natural History Museum marked by Mr. Dandy.
- (2) The need to consider the Grid system in relation to local Floras and Comital Flora.
- (3) The possibility of setting up a Committee to consider the whole future of local Floras in relation to the Society and its activities.

- (4) Consideration of the extent to which the Society can help to sponsor local Floras, and supplements to local Floras, and give them a hall-mark.
- (5) The nomenclature of units of division and especially "tetrads".
- (6) Publication at reasonable intervals of lists of Floras initiated.

The meeting is now open for the concluding discussion, and I hope this summary will assist you to recall the more important points raised in earlier sessions.

CLOSING DISCUSSION

DR. BOWEN opened the final discussion by suggesting that there was a need for the publication of a list of people who are actually engaged in writing Floras and he considered it to be a function of this Society to keep such members in touch with each other. He mentioned an example of two groups trying to write a Flora of the same area.

MR. T. A. W. DAVIS referred to the difference of opinion among those attending the Conference as to whether, should a new Comital Flora be decided upon, the Watsonian vice-counties should be retained or whether sub-divisions based on groups of 25 10-kilometre squares should be substituted. He considered any other type of county boundary to be too unstable to be used. He favoured the 10-kilometre squares as they form a basis for statistical analysis, and because the decimal system was likely to be adopted in Britain. The groups could probably be formed so that they coincided to a considerable extent with present vice-counties.

MR LOUSLEY thought that the question of whether a new Comital Flora should be produced must be referred to a Committee as a proposal from the Conference. In reply to MR. WESTRUP who suggested that the same committee set up to consider county Floras be also asked to deliberate on the question of a new Comital Flora, MR. LOUSLEY made it clear that the proposed committee would have to consider the whole field, with particular reference to such points as the grid system and the extent to which we can encourage people to carry out the production of local Floras on suitable lines.

MR. HALL firmly supported the vice-county system but DR. DONY thought it would be wrong to use a system that was out of date; boundaries were going to alter. MR. KENT was sure that a new Comital Flora would be sold out in two years.

MR. READETT wished to draw a sharp line between the two methods of approach. The Society had made a decision for one purpose in the Maps Scheme. It had been suggested that an alternative to a new Comital Flora might be a small handbook based on the Maps Scheme records but he suggested the answer was in the hands of the compilers of local Floras.

In reply to a member who suggested the Conference should vote on the system to be employed in a new Comital Flora MR. LOUSLEY said that it was not the proper occasion for a vote on such a matter which should be left to the committee. DR. PERRING

did not think that anyone was in favour of producing a Comital Flora on the grid-square basis and DR. DONY pointed out that many people were using the 'Tetrad' system.

PROFESSOR HAWKES wished to support Mr. Gardiner's proposal (see pp.91-92) to have a committee set up, and it would be very useful to have interim reports on Floras as to how their compilers were setting about them. In Warwickshire they had published a few papers in the local journal about their work, and it would be interesting to have similar information from other areas.

MR. GARDINER reminded the Conference that there was already a sub-committee looking into the question of a new Comital Flora and the committee which he had in mind when he made the original proposal in the course of opening the discussion following Dr. Dony's paper would naturally touch on things of interest to the Comital Flora sub-committee.

DR. M. E. BRADSHAW thought there should be a committee to look into the question of 'why' some of these Floras should be published when the Maps Scheme had been working for seven years and had produced an excellent basis for county Floras to enlarge upon. Professor Hawkes was aiming very high, but, in her opinion, anything short of what he was doing was hardly worth while. She thought the new Comital Flora would have its uses but it must be something with the aim of filling in gaps in the Maps Scheme records.

In an effort to encourage a definite conclusion, MR. GARDINER restated his proposal in more precise terms: that this Conference should forward a recommendation to Council that it set up an *ad hoc* committee to make recommendations with regard to the assisting, sponsoring, etc., of the work of these local Floras and to co-operate with any workers who are concerned with the Comital Flora. MR. BANGERTER was prepared to second this. He also wished to thank Dr. Bradshaw for asking a very important question 'why'; but he agreed with Mr. Kent in thinking that there is still a considerable demand for a Comital Flora.

After discussion had gone the full circle, the PRESIDENT, Mr. J. E. Lousley put the motion to the meeting and it was carried. He then brought the Conference to a close.

After saying what a very happy Conference it had been, he said that there could be no doubt about the success of an event where so much enthusiasm had been shown, and so many controversial questions discussed with so much good humour.

He proposed votes of thanks to all those who had read papers or contributed to the discussions, to the President and Council of the Linnean Society for the use of their rooms, and to the Meetings Secretary and members of the Meetings Committee for making the arrangements, and also to the ladies who had provided coffee and tea. These proposals were carried with acclamation.

MR. BANGERTER, on behalf of everyone attending the Conference, thanked the President and Dr. Milne-Redhead for acting as Chairmen.

A SURVEY OF COUNTY FLORAS

H. J. M. BOWEN

In order to obtain background information regarding local Floras in preparation, a questionnaire was circulated to all those botanists known to have written, or to be preparing Floras. With two exceptions, all these workers were studying individual counties, and this survey was accordingly restricted to county Floras. 39 compilers of the 45 contacted sent detailed replies; six of these have actually published Floras during the period 1948-1961. 13 per cent of compilers were not B.S.B.I. Recorders for their counties; the Society should publish lists of compilers more frequently and ensure that compilers are also Recorders for their areas. An analysis of the replies is given below.

1. *Division of the area*

51 per cent. of compilers use some sub-division of the National Grid, 38 per cent. divide counties by river drainage or some other natural feature, and 15 per cent. record by parishes or other artificial feature. These methods of division are not mutually exclusive and two are sometimes used together. Nearly all recently initiated Floras are based on Grid recording, except in areas where geographical features are of dominant importance, as in mountainous terrain or groups of islands. 10 × 10 km.² and 1 × 1 km.² squares are the most popular sizes among Grid recorders, as shown in the following table.

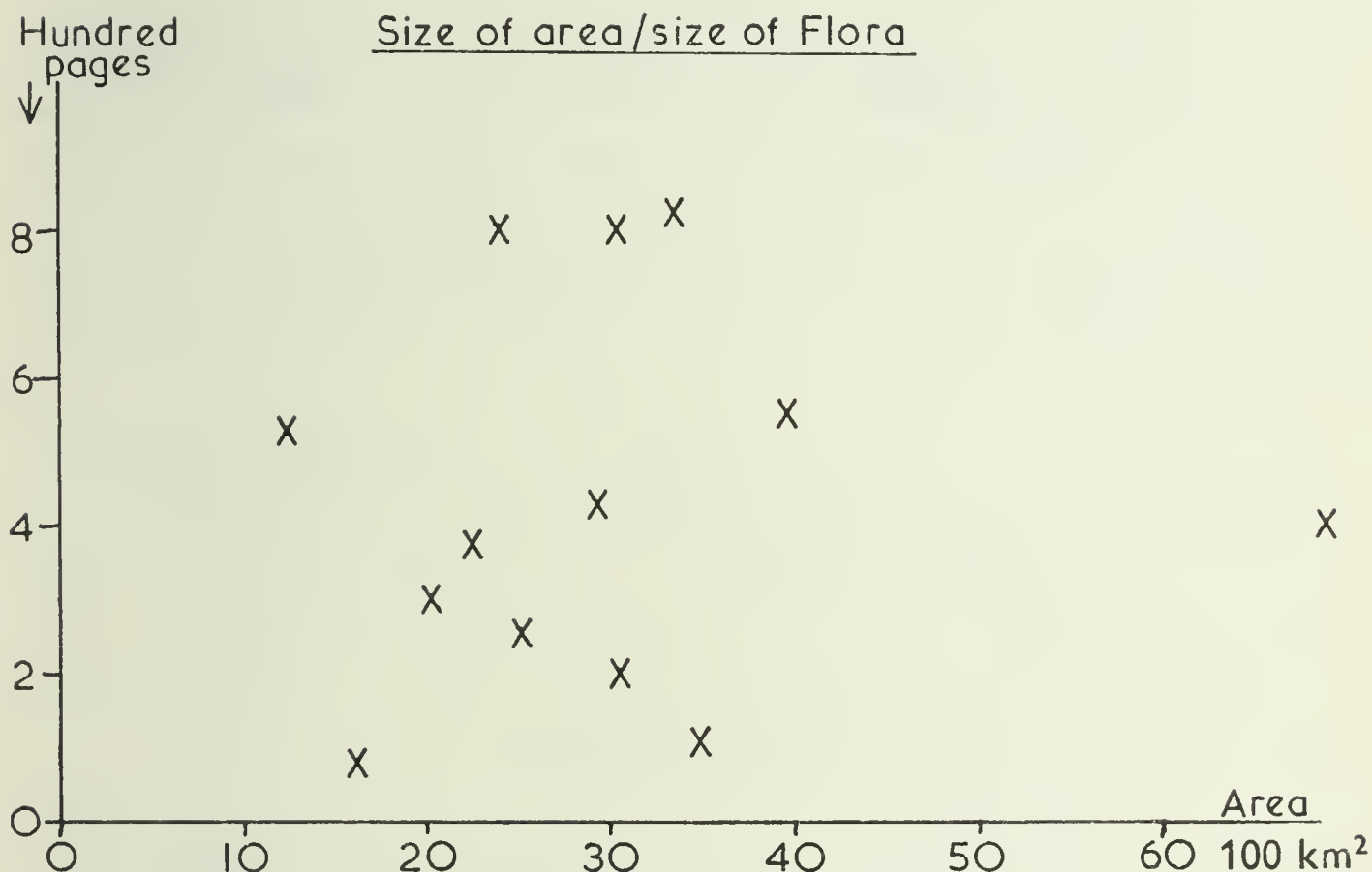
Square size	No. of compilers using this size	Average area per active botanist	Average no. of squares per active botanist
10 km × 10 km	8	1382 km ²	13·8
5 km × 5 km	1	1406 km ²	56·2
2 km × 2 km	4	880 km ²	220
1 km × 1 km	7	845 km ²	845

2. *Number of botanists collecting data*

The number of active collectors of data for a Flora ranges from one to thirty or more; some compilers were unable to enumerate their helpers, but the average is about six. The areas studied range from 16 to 8000 km², and the areas per active botanist range from 16 to 5500 km² with an average of 1016 km². This means that each botanist must search on average ten 10 × 10 km² Grid

squares, or two hundred and fifty 2×2 km² squares, or one thousand 1×1 km² squares. The table on page 102 shows that there is little correlation between the area per active botanist and the size of Grid square chosen. Clearly all botanists are active, but some are more active than others.

FIG. 1



3. Collection of data

Notebooks (57 per cent) are preferred for collection of data in the field, but Maps Scheme or similar cards are becoming more widely adopted (38 per cent). The majority of compilers (54 per cent) keep their records as a card index, but some transcribe direct from field notes to a draft MS Flora or interleaved plant list. The useful records from B.S.B.I. field meetings and local naturalists' outings were frequently acknowledged by compilers.

95 per cent of compilers collect pressed specimens as vouchers, which are sometimes kept privately (35 per cent) but more often preserved in a local Museum or University or in a National Herbarium.

All compilers claim to have searched previous Floras and periodicals for old records: 47 per cent have located annotated Floras or MS lists, often through their local Museums. Only 5.3 per cent mention using N. D. Simpson's valuable bibliography. 49 per cent state that they have consulted herbaria to check old records, but many rely exclusively on local herbaria. All compilers should check through the larger herbaria for local records,

although this is tedious work because of the lack of efficient indexing in most collections.

90 per cent of compilers use the B.S.B.I. panel of referees for identifying critical plants, and the remainder use referees of proved reliability.

4. *Compilation of data*

The time taken to compile a county Flora ranges from 5 to 60 years with an average of 23 years between beginning to collect records and publication. Many Floras represent a lifetime's work.

Few compilers gave definite replies about how much extra information they proposed to give other than a list of plants and localities. It would seem desirable to decide on, and to collect, this information from the outset rather than to assemble it during the writing up. The popularity of different items can be judged from the following list.

<i>Extra information in Flora</i>	<i>Per Cent of compilers giving it</i>
Geographical features	44
Geological formations	40
Soils	24
Climate	36
Biographies of local botanists	12
History of botanical exploration	36
Paleobotany	8
Plant ecology	68
Plant distribution	48
Plant distribution maps	20
Taxonomy of local variants	12
Local names	8
Local times of flowering	4
Bryophytes	16
Fungi or lichens	12
Algae	0

5. *Costs*

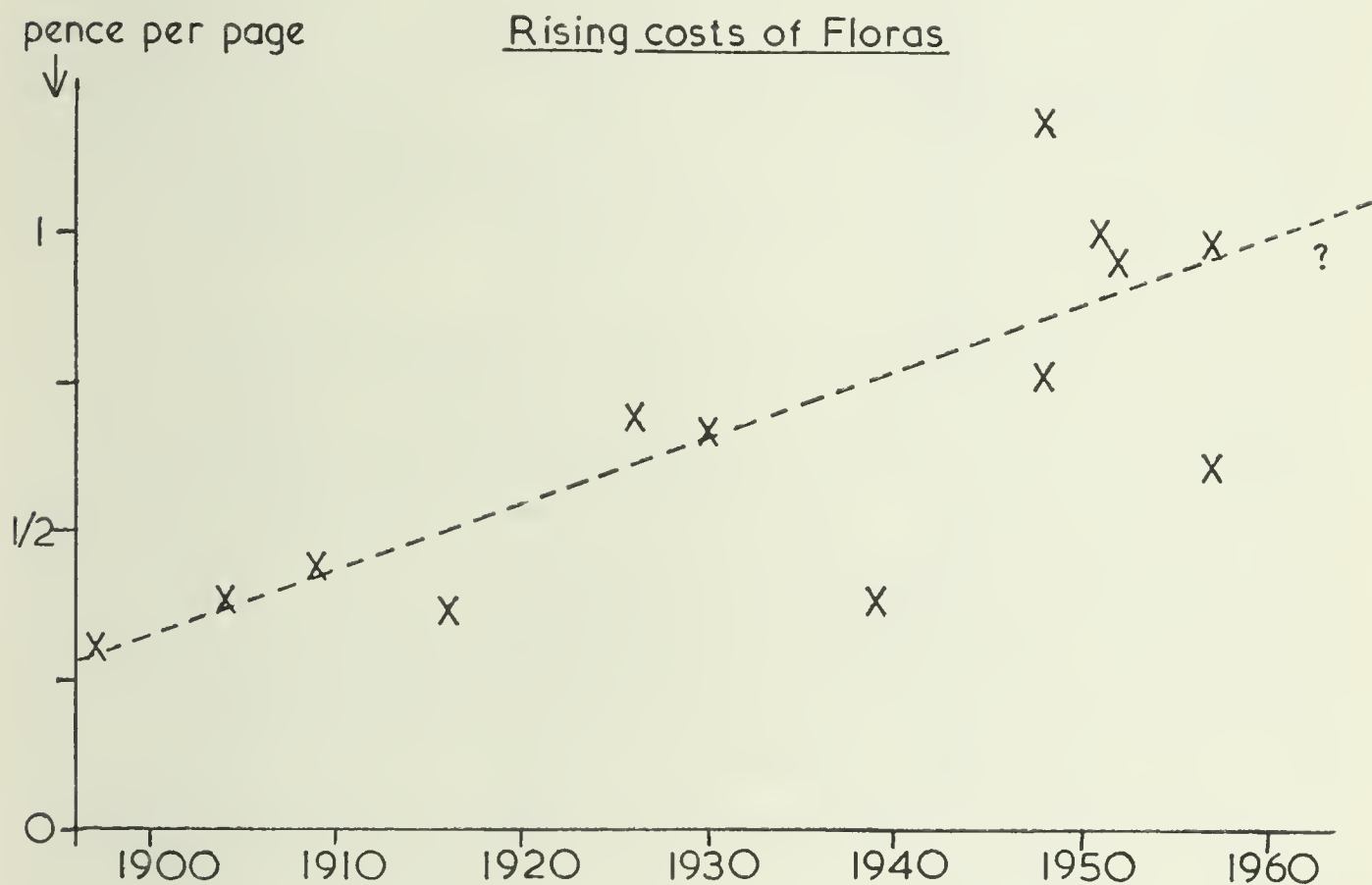
The following figures are based on the small number of compilers who gave actual figures or reasoned estimates of costs; Mr. N. D. Simpson kindly supplied figures for older Floras for comparison.

County Floras may have from 70 to 1250 pages, the average being 470 pages. Fig. 1 illustrates that there is no relation between the size of the Flora and the size of the county.

The cost of publishing a county Flora ranges from £150 to £4000 with an average of about £1700. The average cost per page to the purchaser is 0·95d, but this has risen steadily during the century as Fig, 2 shows.

Most compilers appear to have made no estimate of publication costs, although such estimates are quite easy to make and may be the main factor limiting publication. Estimates should be made at all stages of composition, and not only when the MS is finally ready for the printer. At least three Floras covered by the present survey are likely to remain unprinted purely for financial reasons.

FIG. 2



COUNTY FLORAS RECENTLY PUBLISHED OR IN PREPARATION

<i>v.c. No.</i>	<i>County</i>	<i>Compilers</i>
0	Channel Isles	D. McClintock and Mrs. F. Le Sueur.
1b	Isles of Scilly	J. E. Lousley.
5, 6	Somerset	P. F. Hunt.
7, 8	Wilts.*	J. D. Grose.
9	Dorset*	R. D'O. Good.
10-12	Hants.	A. W. Westrup.
13, 14	Sussex†	O. Buckle.
15, 16	Kent	F. Rose.
17	Surrey	J. E. Lousley, <i>et al.</i>
18, 19	Essex	S. T. Jermyn & B. T. Ward.
20	Herts.	J. G. Dony.
21	Middx.	D. H. Kent.
22	Berks.	H. J. M. Bowen, <i>et al.</i>
25, 26	Suffolk	F. W. Simpson.
27, 28	Norfolk	C. P. Petch & E. L. Swann.
29	Cambs.	F. H. Perring.
30	Beds.*	J. G. Dony.
31	Hunts.	J. L. Gilbert.
32	Northants.	G. Laundon.
35	Monmouth	A. E. Wade.
36	Hereford	Mrs. L. E. Whitehead.
38	Warwicks.	J. G. Hawkes & R. C. Readett.
39	Staffs.	E. L. Edees.
48	Merioneth	P. M. Benoit & Mrs. H. M. Richards.
51	Flint†	A. A. Dallman.
53, 54	Lincs.	Miss E. J. Gibbons.
55b	Rutland	J. H. Chandler.
56	Notts.*	R. C. L. Howitt.
57	Derby	A. L. Thorpe.
59	S. Lancs.	J. P. Savidge.
61	E. Yorks.	Miss F. E. Crackles & R. D'O. Good.
62-65	N. Yorks.	Miss C. M. Rob.
70	Cumbs.	D. A. Ratcliffe.
71	Isle of Man	D. E. Allen.
81	Berwick	A. G. Long.
82-84	Lothians	Miss E. P. Beattie.
90	Forfar	G. Taylor.
91	Kincardine	Mrs. A. H. Sommerville.
96b	Nairn	Miss M. M. Webster.
98	Argyll	K. N. G. Macleay.
102-104	Inner Hebrides	Miss M. S. Campbell.
107-8	Sutherland	J. Anthony.
112	Shetland	R. C. Palmer & W. Scott.
H 20	Wicklow*	J. P. Brunker.
H 33	Fermanagh	R. D. Meikle.

†No recent confirmation.

*Flora published.

H. J. M. BOWEN.

EXHIBITS WHICH ILLUSTRATED SOME PAST, PRESENT, AND

FUTURE LOCAL FLORAS

FLORA OF MERIONETH

Methods of collecting records in the county were described with the aid of maps and diagrams. A Flora of the county is at present being published in serial form.

P. M. BENOIT and Mrs. M. RICHARDS.

RECENT CHANGES IN THE FLORA OF BERKSHIRE

The position of Berkshire with regard to local Floras is typical of several of the better worked English counties. A Flora of great excellence, listing 1208 species, was brought out sixty-four years ago by G. C. Druce, and a supplement by the same author in 1918 included only 23 additions to the county list. So complete was Druce's coverage that few new discoveries have been made since his death, although Maps Scheme records showed that the county had not been completely worked out. The question arises as to whether there is any point in preparing a new Flora.

For counties of this type it might be better to publish regular supplements to the Flora, at about ten year intervals. This method has the disadvantage that species may be neglected for several decades when they are slowly increasing or decreasing, but this also occurs with the present haphazard system of recording. In Berkshire a relatively small number of species have changed markedly in abundance since 1897. A preliminary list of these, divided somewhat arbitrarily by habitat, was given, which can be summarised in the following table.

<i>Habitat</i>	<i>No. of increasing species</i>	<i>No. of decreasing species</i>
Woodland	17	3
Acid grassland and heath	6	8
Basic grassland	11	5
Bog	1 ?	11
Fen	3	3
River banks	5	1
Pond margins	2	10
Walls	6	1
Arable land	12	14
Waste ground	35	1

Graphs of weather statistics and changes in land usage were given. The climate does not appear to have altered much recently, though the winters may be getting warmer and wetter. It might be argued that the gradual disappearance of Northern species (e.g. *Botrychium*, *Lycopodium selago*, *Parnassia*, *Pinguicula vulgaris* and *Thelypteris limbosperma*) and the spread of species from Southern Europe (e.g. *Euphorbia cyparissias*, *Himantoglossum*, *Illecebrum*, *Nardurus*, *Silene conica* and *Tetragonolobus*) have been caused by the warming up of the climate; but the evidence is not strong when examined more closely. It is quite likely that the increasingly wet winters have favoured the spread of the three wall ferns, *Asplenium adiantum-nigrum*, *A. trichomanes* and *Ceterach*.

By far the most important causes of change in the Flora are the activities of man. The ploughing up of grassland, the draining of bogs, the destruction of ponds and the application of scientific husbandry to arable land are responsible for most of the decreases mentioned above. After a series of fluctuations caused by successive booms and slumps in agriculture, the percentage of arable land in the county is as high as it ever has been. On the other hand man has introduced many new species, mostly confined to waste and disturbed ground.

Berkshire is fortunate in that its riverbanks, its small but rich area of fenland, and its extensive woods have not recently been and are unlikely to be profoundly altered by man. In these habitats the gains outweigh the losses and show that many ecological niches remain unfilled.

H. J. M. BOWEN.

THE LLEYN FLORA

Work in progress on the Lleyn Flora was shown, e.g. cataloguing the occurrence of the common and the rare species and more detailed mapping of selected examples; comparison with Griffith's Flora regarding his 'common' species which appear to be absent or rare in Lleyn. Distribution maps of selected species were shown to illustrate the special characteristics of the Lleyn flora: its richness in 'oceanic' species; the lack of a rich mountain flora: the poverty of and restricted occurrence of basiphilous species and the absence of certain weeds and aliens and of 'railway' plants; and a general comparison with Caernarvonshire as to the representation of the several 'geographical elements'.

Miss A. P. CONOLLY.

SAMPLES OF PRINTING AND PRINTERS' COPY

A block of printers' type, together with examples of manuscripts suitable for, and virtually unintelligible to, the printer were exhibited.

R. W. DAVID.

FLORA OF BEDFORDSHIRE

Copies of Prospectus of *Flora of Bedfordshire* (1953). Presentation copy to author by Luton Borough Council. Specimen pages of manuscript.

J. G. DONY.

FLORA OF HERTFORDSHIRE

A revision of the Hertfordshire Flora was begun in 1955 and the object of the exhibit was to show the method being used and the problems involved.

- (a) *The County*. Maps of Administrative County and Watsonian vice-county; the area of study (a combination of these); and areas covered by various Natural History Societies interested in the county.
- (b) *Features of the County*. Maps showing Geology, Rainfall, Altitude, Built-up Areas and Conservation Areas.
- (c) *Dividing the County*. Maps showing divisions adopted by Webb and Coleman (1848), Pryor (1887), Swinscow (1959) and one based on the main geological features.
- (d) *Recording*. Record card showing colours used to distinguish records made in various years in the field.
Card Index consisting of sheets with entries in Pryor's Flora stuck on and subsequent records added.
Map showing National Grid with four complete ten-kilometre squares and parts of twenty-six: this has been rejected as an unsatisfactory basis for recording.
Map showing tetrads of four square kilometres of which there are 330 full tetrads and parts of 166: this has been adopted.
- (e) *Progress*. Maps showing the state of recording in 1959, when 30 tetrads had over 200 plants recorded. In 1960 a further 100 tetrads with over 200 records were added and in 1961 a further 206. At the end of 1961 336 tetrads had more than 200 records and 91 tetrads had 150-200 records.
- (f) *Some Results of the Study*. Maps showing results based on the above recordings to date:—*Dactylis glomerata*, a common species easily recognised in all seasons; *Ranunculus ficaria*, a common species recognised only in the spring; *Veronica beccabunga*, a common species of wet places; *Dryopteris filix-mas*, a common woodland species; *Clematis vitalba*, a common calcicole; *Pteridium aquilinum*, a common calcifuge; *Orobanche elatior*, *Impatiens capensis*, and *Silene noctiflora*, species of restricted distribution in the county.
- (g) *A comparison of the floras of Hertfordshire and Bedfordshire*. Comparative lists of species extinct in either or both counties and species known to occur in one county only.

HOW MANY SPECIES MAY BE EXPECTED TO OCCUR IN A LIMITED AREA

This was an attempt to determine, having given the number of species known to occur in a county of known area, the number of species that might be expected to occur in one square kilometre and four square kilometres. No definite conclusion was reached.

J. G. DONY.

COLOURED REPRODUCTIONS OF FOUR ILLUSTRATIONS IN RELHAN'S
FLORA CANTABRIGIENSIS (1820)

The plants shown were *Anemone pulsatilla*, *Thesium humifusum*, *Senecio integrifolius* and *Seseli libanotis*. Although Relhan wrote his Flora some 140 years ago, it is of interest to note that all these four chalk species persist on the low Cambridgeshire downland, now greatly diminished in area as a result of man's activities. *Seseli libanotis* occurs to-day in neighbouring Hertfordshire, near Baldock, and in Bedfordshire at Pegsdon. The *Anemone* and *Senecio* still occur in both of these adjacent counties and the *Thesium* in Hertfordshire.

C. S. DOWNER.

AN OLD WARWICKSHIRE HERBARIUM

An exhibit of full-size photographs was shown of some of the more interesting pages from an old Warwickshire herbarium, made, so far as can be ascertained, by Henry Holden (1662-1710) of Erdington, Birmingham, and Fellow of Magdalen College, Oxford.

The plants were probably gathered between 1688 and 1704, and are of interest for their scientific and vernacular names, as well as for their localities, though unfortunately very few of these are noted. Several plants were collected in Warwickshire, others in Herefordshire, Gloucestershire, Staffordshire, Lincolnshire, Hampshire and Berkshire. It is possible that some of these might constitute first county records for the plants in question.

J. G. HAWKES (Birmingham).

FLORA OF WARWICKSHIRE

The exhibit was designed to show the distribution, habitats and frequencies of plant species in Warwickshire. These are being surveyed by the method of area recording described. Stages in the process with some interim data and maps were displayed.

The county is divided into units of one square kilometre, identical with the smallest subdivision of the National Grid. These "basic squares", of which there are about 2500 in Warwickshire,

are being surveyed by a team of botanists from the Botanical Section of the Birmingham Natural History and Philosophical Society and the Botany Department of the University. To reduce the work involved only one in every four of the basic squares is surveyed. This square is chosen at random so that statistical work on habitats will be possible; there will be no personal bias in the choice of squares which might overweight particular habitats in relation to their existence in the county as a whole.

Each collector takes one or more basic squares and is registered for these on the "Master Map". Several visits at different times of the year are made to each square and a list is made of all species found, with habitats and frequencies. The habitats are grouped into eight major categories:

- | | |
|---------------|--------------------------------------|
| (1) Woodland | (5) Marginal (i.e., Hedgerows, etc.) |
| (2) Waterside | (6) Grassland |
| (3) Water | (7) Cultivated land |
| (4) Heath | (8) Ruderal (i.e., Waste land) |

Two maps of 1 km. squares and the plant lists obtained from them were shown together with a Collector's Card with instructions for use in the field.

When squares are completed the lists are sent to the Recorders and the records are copied on to species cards. Species cards have been designed so that the records for 1 km. squares can be written within squares drawn to the same scale as on the 1" O.S. map. Each card represents a 10 km. or major square, and the whole of the cards for any one species can be laid out so that they themselves form a map.

The maps shown in the rest of the exhibit are preliminary attempts at recording the distribution of a number of species. A distinctive symbol is used for each habitat category. In a few cases an attempt has been made to compare the distribution of calcicolous and calcifugous plants with the known geological structure of the county. A map showing the positions of the chief lime-bearing strata was also shown.

Finally, a series of habitat analyses has been made to show the habitat range and preference of some of the species mapped. These analyses show that although many species overlap considerably, their habitat preferences do not necessarily coincide. Also it can be seen that some species (e.g. stinging nettle) have a wider range of tolerance than others (e.g. stemless thistle).

It is hoped to publish the Flora in the form of a volume of text and a volume of maps. A map, photographically reduced to a size suitable for publication, was shown. Transparent outline maps of soils, land use, drift geology, topography, etc., will be available for use with the Flora. It will be possible to place these over the distribution maps so that further conclusions may be drawn about the distributions of the species mapped.

J. G. HAWKES and R. C. READETT.

FLORA OF NOTTINGHAMSHIRE

Sample MS. pages were shown from this Flora, which was almost ready for publication.

R. C. L. HOWITT.

FLORA OF NAIRN

Six illustrations in colour, by Miss M. A. Grierson, intended for the Flora, were exhibited, together with a vegetation map of the county.

Pressed specimens, about twenty per sheet, were shown depicting typical plants of saltmarsh, dunes, moorland, pinewood and cornfield with live material of lichens and mosses.

A short resumé of field work already done, records, geology, weather (mean annual temperature and rainfall) and an extract of the bibliography of the county were included.

Miss M. McCALLUM WEBSTER.

FLORA OF PORTHLEVEN

A copy of this Flora of a small area, which has recently been published, was shown. It includes lists of all animals and plants known in the vicinity of Porthleven, Cornwall.

H. B. SARGEANT.

FLORA TUNBRIDGENSIS

Copies of each of the four Floras of Tonbridge and Tunbridge Wells, Kent, were exhibited. These are:

Flora Tonbridgensis, by T. F. Forster, 1816, and a second edition with a supplement by his son, T. I. M. Forster, 1842;

Flora of Tunbridge Wells, by E. Jenner, 1845;

Flowering Plants of Tunbridge Wells and Neighbourhood, by R. Deakin, 1871;

Flora Tonbridgiensis, by J. E. Little, 1884-88.

In each case notes on the relative merits and aspects of the book were given, and an assessment was made of the value of the flora and any other works of the respective authors to the knowledge of the area in question. A copy was also exhibited of *The Botanical Pocket Book*, printed and probably compiled by J. Clifford, 1840. Most of these works are now very scarce, most of those exhibited belonging to the Tunbridge Wells Museum.

CLIVE A. STACE.

FLORA OF SURREY

The Surrey Flora Committee showed their methods and results by means of a 10 km. square map divided into 25 "tetrads", with examples of "Surrey Cards" (one used for each tetrad), and Individual Record Slips relating to it. Results were shown on correspondingly ruled distribution maps for *Viola hirta*, *Molinia caerulea*, *Impatiens capensis*, *Artemisia verlotorum*, etc.

The Surrey Flora Committee was elected in January 1957 to organise the collection of records for a new Flora and in this task it receives valuable assistance from a network of helpers.

THE SURREY FLORA COMMITTEE.

FLORA OF HAMPSHIRE

The use of graph paper provides a handy "National Grid". Plant distribution can then be compared with various factors by the use of tracing-paper maps.

Some idea was given of the volume of work entailed in dealing with three vice-counties. Even a "tetrad" system calls for over 1000 lists. Assuming an average of 300 species per tetrad for a good coverage, 22% has been listed since 1950, mostly in the last three years.

A. W. WESTRUP.

FLORA OF CAMBRIDGESHIRE

Work on the text of a new Flora of Cambridgeshire (v.c. 29) is now almost finished, and printing should begin early in 1963. The Flora has been compiled from records of the Cambridge Natural History Society kept in the University Herbarium. The aim is to produce a relatively cheap, compact reference work which is up-to-date on nomenclature, taxonomy and distribution. The requirements of University students have been borne in mind, particularly in the inclusion of Pteridophyta and Bryophyta, and the provision of field keys to certain vascular plant groups which experience has shown present special difficulties.

The distribution data for any species are given by enumerating the operative last two figures of the 10-km. National Grid. Ref. There are 40 such squares partly or wholly within v.c. 29. It is interesting that the total recorded flora of 52/45, which includes the City of Cambridge, is the largest in the British Isles—almost exactly 1000 species of vascular plant! Three centuries of almost continuous recording is of course partly responsible for this 'richness'.

The introduction to the Flora deals with history, and gives a survey of the main soil and vegetation types. An extensive bibliography lists the more important papers on the Cambridge-shire flora and vegetation.

The book will be published by the Cambridge University Press for the Natural History Society, with the help of a grant from the Royal Society. A specimen page was exhibited.

Editors: F. H. PERRING, P. D. SELL, S. M. WALTERS,
and H. L. K. WHITEHOUSE.

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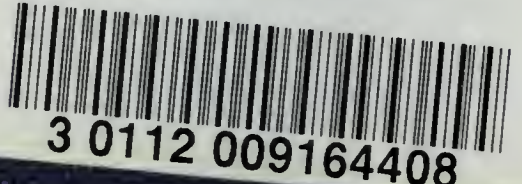
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